May 20, 1920 American Machinist Vol. 52, No. 21

The NAVY YARD at NEW ORLEANS

by FRED H COLVIN

EDITOR - AMERICAN MACHINIST

The demand of the war made it necessary to increase the capacity of all our Navy Yards, as well as other shipyards, the yard at New Orleans being no exception. This article shows some of the work done and gives an idea of how all helped to win the war.

THE location of the New Orleans Navy Yard is particularly attractive, being on the bend of the Mississippi River, which gives the City of New Orleans its name as the "Crescent" city. The particular disadvantage perhaps is that, in common with the rest of the surrounding country, it lies considerably below the level of the river, depending upon the levee for its protection from inundation. This will be seen in some of the illustrations. For a small yard it is very well equipped and is now in command of Captain George S. Cooper, Commander John H. Walsh being senior naval constructor, while Lieutenant-Commander L. M. Bellinger is Industrial Engineer, assisted by Lieutenant Welch, who has direct charge of the shop. The headpiece shows the floating drydock with two small ships in process of repair. This dock is well equipped in every way with all necessary apparatus, including the swinging bridges by which access is had from the upper deck of the dock, to the ship. At the right, tied up along the levee are numerous tugs and sub-chasers which were built in this yard. Another interesting view in the drydock is that of one of the German submarines, U. B. 88, this being shown in Fig. 1. Except for a crumpled prow it is in good condition, this view showing the two torpedo tubes on each side opened. It also shows the gun on deck, the conning tower and the general construction.

Among the war activities of the yard was the building of submarine chasers and harbor tugs. The chasers are 110 ft. and the harbor tugs 88 ft. long. The method of building the hulls for the sub-chasers is shown in Figs. 2 and 3. The hulls, as can be seen, are built along the side of the levee on the timber foundation shown, and are launched sideways. Fig. 2 shows the keel of submarine chaser No. 444, the stem also being in position. In Fig. 3 the hull has pro-

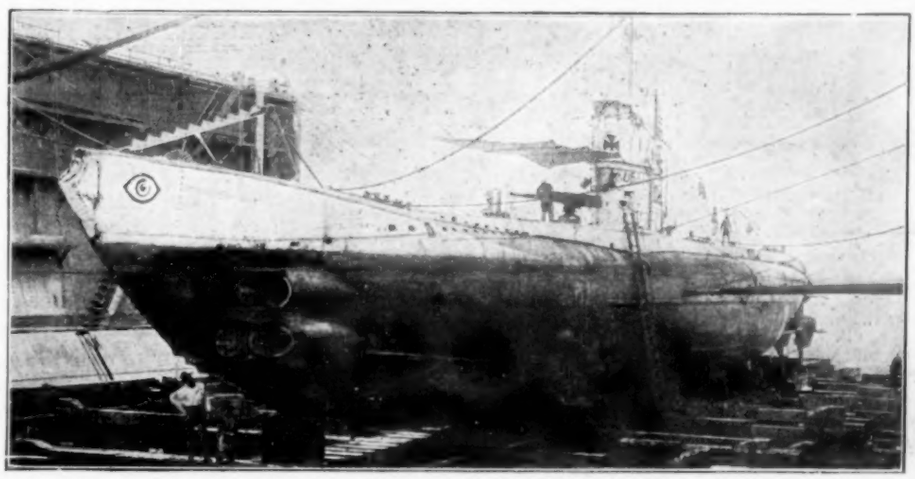


FIG. 1. GERMAN U-BOAT IN DRYDOCK

FIG. 2. LAYING KEEL OF SUBMARINE CHASERS

gressed considerably, being what is known as "in frame." One method of launching the sub-chaser is to let the cradles in which the hull rests slide into the water with the hull. By this method the chaser is launched sideways. Another method of launching this same type of boat is shown in Figs. 4 and 5. Here the hull was built on the dock instead of on the levee and, after completion, the hull is swung into the water by means of the 100-ton floating derrick, Pelican, which can be seen to some extent in both views. This is practically the same method as used at Panama, and described in previous articles by Commander Gatewood. It requires good judgment in placing the slings, care in preventing slipping, and in hoisting and lowering. The method of holding the end slings against slipping toward the center is clearly shown in Fig. 5, where the slings are securely fastened by rope to prevent any movement toward the center. The harbor tugs already referred to are smaller than the sub-chasers, one being shown in Fig. 6. The view also gives an idea of the docks, with the back water between it and the levee and also shows how the land of the whole Navy Yard lies considerably below the top of the levee which protects it from the river. The engine for one of the harbor tugs is shown in Fig. 7. These engines were completely built in the Navy Yard shops, and, the one shown, is being tested under steam. This Navy Yard does all sorts of repair work in addition to building hulls, as shown. One of its war jobs was the repairing of the German Steamer "Gutheil," which was sunk in the Mississippi River and was under water for some months. This necessitated almost complete overhauling from stem to rudder.

The plate shop is equipped with a large bending roll,

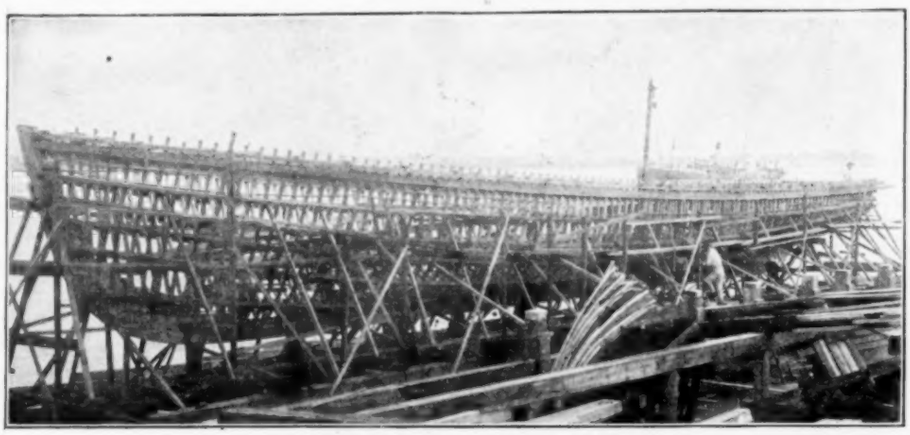


FIG. 3. SUBMARINE CHASER IN FRAME

and Fig. 8 shows how these are being utilized for making angle bends when no bending press is available. The block *A* is fastened around the upper roll by means of the strap *B*, while the heavy angle plate *C* rests on the lower roll. By raising the upper or movable roll, the piece to be bent is simply placed between *A* and *C*, and the roll forced down by power. This makes a very acceptable bending press of considerable range and power. Among the almost regular jobs of the Navy Yard are repairs on the Mississippi River dredges. The water of the Mississippi carries so much mud in suspension that it has a very decided scouring action on the inside of the centrifugal pump casing of the dredger and similar parts. To overcome this, the pump casing, as well as other parts which are worn away by this action, are periodically built up with the oxyacetylene torch. This is used simply to deposit new metal to take the place of that worn away by the action of the material

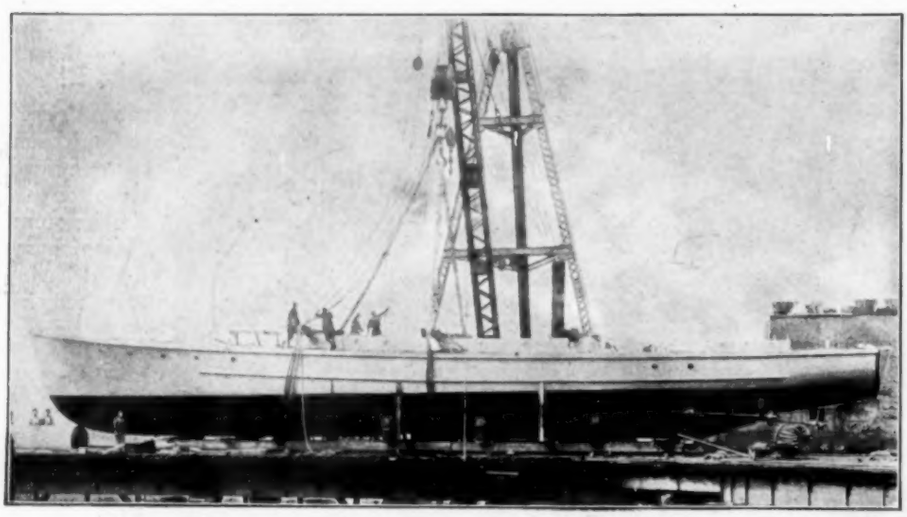


FIG. 4. ONE METHOD OF LAUNCHING

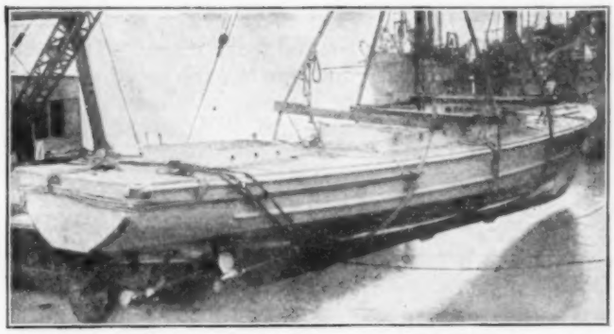


FIG. 5. SWINGING THE CHASER INTO THE WATER

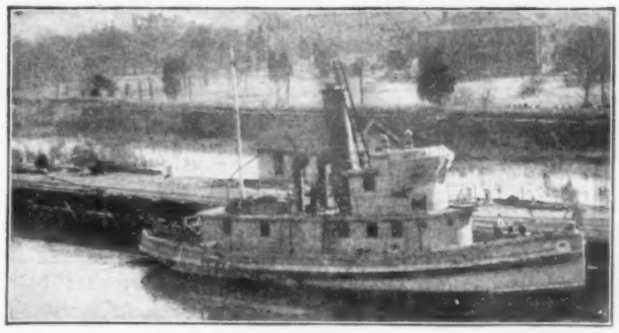


FIG. 6. ONE OF THE HARBOR TUGS

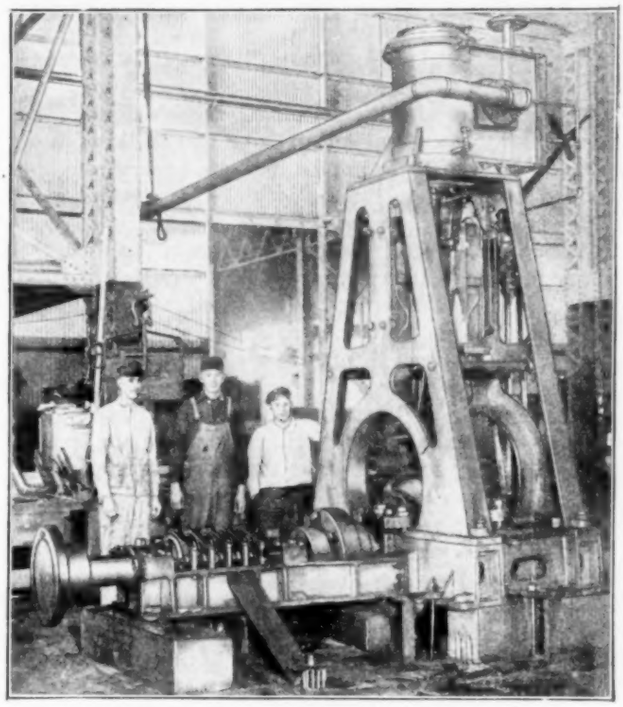


FIG. 7. ENGINE FOR HARBOR TUG

being pumped. This problem of mud in the Mississippi water also extends to the outboard bearing of propeller shafts. After considerable experimenting with various kinds of materials, it has been found that cast iron makes the best outboard bearing under these conditions.

Another interesting development in the shop is the use of California redwood for patterns in place of pine, cherry or mahogany. This has been tried in the making of patterns and is proving very satisfactory. It is reported to work fairly well and to be considerably cheaper than either of the other woods named.

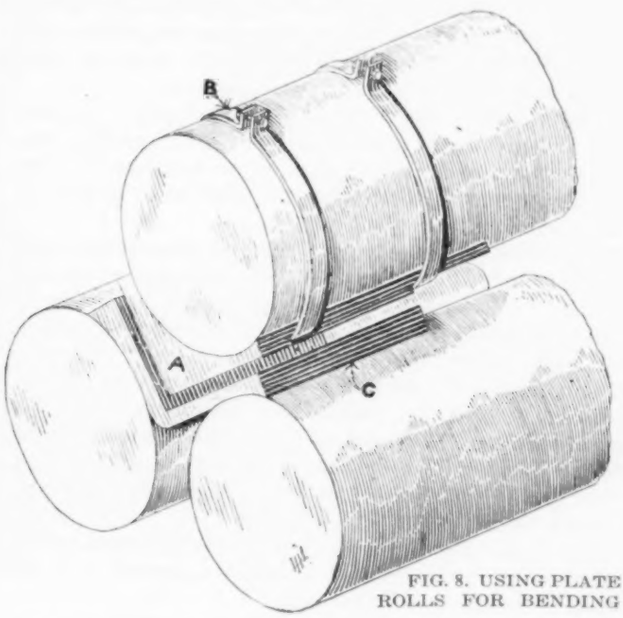
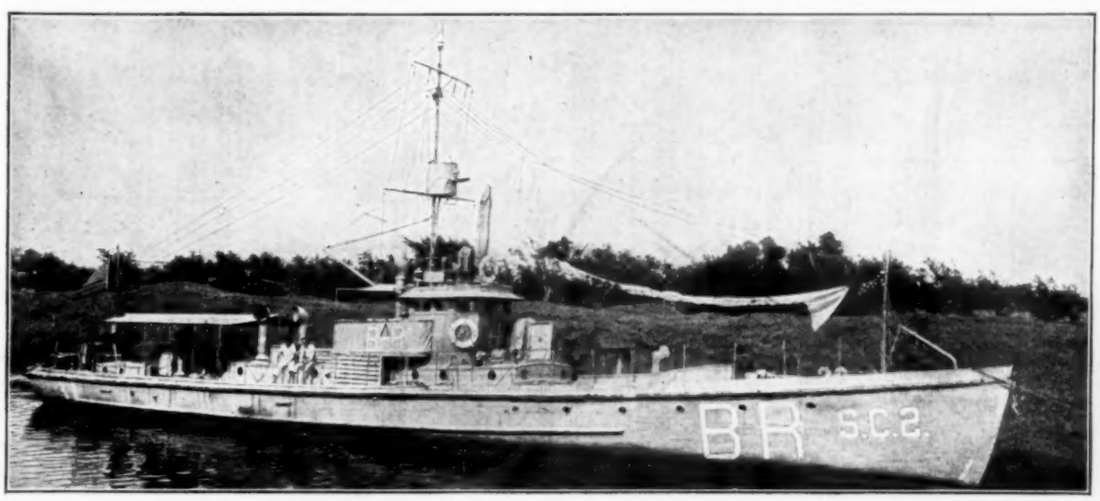


FIG. 8. USING PLATE ROLLS FOR BENDING

Quite a large variety of work can be handled in this yard, as is evident from the foregoing discussion, and it is probable that the importance of the yard will increase as time goes on. An idea of the sort of work which has been turned out can be gotten by referring to the tailpiece, which shows one of the sub-chasers fully equipped and ready for duty.



An Aid to Determine Pulley Diameters and Speeds

BY JULIUS KLEIN

The accompanying table of pulley diameters and speeds will be of help to both shop men and designers. The table was worked out by the writer as a means of determining the sizes of pulleys to be used on countershafts when the speed at which the line shaft revolved was known. It is based on the formula:

$$DN = D_1N_1;$$

where, D = Diameter of driving pulley;
N = Revolutions per minute of driving pulley;
D_1 = Diameter of driven pulley;
N_1 = Revolutions per minute of driven pulley.

The belt speeds given at the tops of the columns are in feet per minute and the diameters of pulleys are in inches. The table offers a convenient means of solving pulley problems within the range given.

The two problems which follow are given to illustrate the use of the table, the method of handling the data being shown in the solutions. Solutions can be determined very quickly, since the method of operating the table is quite simple.

(1) Given an 8-in. pulley mounted on a line shaft revolving at 225 r.p.m., to find the size of pulley required to make the countershaft revolve at 90 r.p.m.

In the first column, find the 8-in. pulley diameter and follow to the right until 225 is reached. In this column, under 18-in. pulley diameter, read downward to 90 r.p.m. and then follow back on the same line to the first column and read 20 in. This is the required pulley diameter. To find the belt speed, read above the 18-in. pulley diameter just mentioned, 471.2 ft. per minute.

(2) Given a 20-in. pulley on a line shaft running at 310 r.p.m., to find the revolutions per minute of a 30-in. pulley mounted on a countershaft.

In the pulley-diameter column pick out 20 and follow to the right until 100 is reached. Read down to 66.66 in this column, which is the speed for the corresponding 30-in. pulley. Then $66.66 \times 310/100 = 206.6$ r.p.m., the speed of the countershaft pulley. The belt speed will be obtained by multiplying the speed ratio by the belt speed found at the top of the column in which 66.66 r.p.m. is: $523.6 \times 3.10 = 1{,}523.16$ ft. per minute.

Accurate Squaring Device for Planing Machine

BY HARRY SENIOR

In an article published under this caption on page 946 of *American Machinist*, E. A. Dixie describes a device used for squaring work on the platen of a planing machine and used in his shop where, he says in effect, "square" is a good deal "squarer" than it is in some other shops.

I have no especial criticism of Mr. Dixie's device, but I would like to point out an error or two in the line of reasoning by which he proves it to be superior to the standard tool; which, by the way, he designates as a "beam-square."

No doubt, a careful man could square a piece on the planing machine as accurately with Mr. Dixie's "round square" as I could with the standard article, but I stoutly maintain that he couldn't square it any "squarer." The chances of error with the new-fangled "dinguss" in the hands of a careless man are equal to or greater than with the old-fashioned instrument; while in either case it would still require the application of a regular try-square to test the work after planing.

Mr. Dixie says: "Accurate squares are not common and squares, the accuracies of which are permanent, do not exist." He might with equal point have said that sharp cutting tools are not common and cutting tools that permanently retain their sharpness do not exist. All tools have to be taken care of. It is quite as easy to test a square for squareness as it is to test a tool for dullness; indeed the act of applying a square to a job like the one he shows would, in the hands of a mechanic, supply its own test.

The edge or side of a planing-machine platen may be more exposed to abrasion than the corners of the

TABLE SHOWING THE RELATION BETWEEN SHAFT

Belt Speed Dia., In.	52.36 2	78.54 3	104.72 4	130.9 5	157.1 6	183.3 7	204.4 8	235.6 9	261.8 10	287.98 11	314.2 12	340.4 13	366.6 14	392.7 15
	R.P.M.													
2	100.0	150.0	200.0	250.0	300.0	350.0	400.0	450.0	500.0	550.00	600.0	650.0	700.0	750.0
3	66.66	100.0	133.3	166.6	200.0	233.3	266.6	300.0	333.3	366.6	400.0	433.3	466.6	500.0
4	50.00	75.0	100.0	125.0	150.0	175.0	200.0	225.0	250.0	275.0	300.0	325.0	350.0	375.0
5	40.00	60.00	80.00	100.0	120.0	140.0	160.0	180.0	200.0	220.0	240.0	260.0	280.0	300.0
6	33.33	50.00	66.66	83.33	100.0	116.66	133.33	150.0	166.66	183.33	200.0	216.66	233.33	250.0
7	28.57	42.85	57.14	71.42	85.71	100.0	114.28	128.57	142.85	157.14	171.42	185.71	200.0	214.28
8	25.0	37.50	50.0	62.50	75.0	87.50	100.0	112.50	125.0	137.50	150.0	162.50	175.0	187.50
9	22.22	33.33	44.44	55.55	66.66	77.77	88.88	100.0	111.11	122.22	133.33	144.44	155.55	166.66
10	20.0	30.00	40.00	50.00	60.00	70.00	80.00	90.00	100.00	110.00	120.00	130.00	140.00	150.00
11	18.18	27.27	36.36	45.45	54.54	63.63	72.72	81.81	90.90	100.00	109.09	118.18	127.27	136.36
12	16.16	25.00	33.33	41.66	50.00	58.33	66.66	75.00	83.33	91.66	100.00	108.33	116.66	125.00
13	15.38	23.07	30.76	38.46	46.15	53.84	61.53	69.23	76.92	84.61	92.31	100.00	107.69	115.38
14	14.28	21.28	28.57	35.71	42.85	50.00	57.14	64.28	71.42	78.57	85.71	92.85	100.00	107.13
15	13.33	20.00	26.66	33.33	40.00	46.66	53.33	60.00	66.66	73.33	80.00	86.66	93.33	100.00
16	12.50	18.75	25.00	31.25	37.50	43.75	50.00	56.25	62.50	68.75	75.00	81.25	87.50	93.75
17	11.76	17.64	23.53	29.41	35.29	41.17	47.06	52.94	58.82	64.70	70.59	76.41	82.35	88.23
18	11.11	16.66	22.22	27.77	33.33	38.88	44.44	50.00	55.55	61.11	66.66	72.22	77.77	83.33
19	10.52	15.79	21.05	26.31	31.58	36.84	42.10	47.36	52.63	57.85	63.15	68.42	73.63	78.94
20	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	55.00	60.00	65.00	70.00	75.00
21	9.52	14.28	19.04	23.81	28.57	33.33	38.09	42.85	47.62	52.85	57.14	61.90	66.66	71.42
22	9.09	13.63	18.18	22.72	27.27	31.81	36.36	40.90	45.45	50.00	54.54	59.09	63.63	68.18
23	8.69	13.04	17.39	21.93	26.09	30.43	34.78	39.13	43.47	47.82	52.17	56.52	60.87	65.21
24	8.33	12.50	16.66	20.83	25.00	29.16	33.33	37.50	41.66	45.83	50.00	54.16	58.33	62.50
25	8.0	12.00	16.00	20.00	24.00	28.00	32.00	36.00	40.00	44.00	48.00	52.00	56.00	60.00
26	.....	11.58	15.38	19.23	23.08	26.92	30.77	34.67	38.46	42.31	46.16	50.00	53.89	57.69
27	.....	11.11	14.81	18.52	22.22	25.92	29.63	33.33	37.03	40.74	44.44	48.15	51.85	55.55
28	.....	10.64	14.29	17.86	21.43	25.00	28.57	32.14	35.71	39.29	42.86	46.43	50.00	53.57
29	.....	10.34	13.79	17.24	20.69	24.13	27.58	31.03	34.82	37.93	41.38	44.82	48.27	51.27
30	.....	10.00	13.33	16.66	20.00	23.33	26.66	30.00	33.33	36.66	40.00	43.33	46.66	50.00

central T-slot. The latter is, however, by no means exempt and the former is much easier of correction. The careful man will first try this surface by placing the stock of his square against it, when, if the slightest hump appears, it will instantly become apparent through his sense of touch—the square will rock." Thirty seconds' work with a float file will correct even a bad case of abrasion and over correction is practically impossible.

If a very slight hump exists on the narrow line of contact between Mr. Dixie's device and the iron it will throw the tool out of parallel with the platen, and because of the narrow line of contact, over correction with a file is only too easy. Moreover, the tool, being cut away in the middle, will not of its own volition disclose an error in this respect while the square will.

Further, the round bar would be perfectly still with one end resting upon a hump, and the indicator point would be too far forward when turned to one side and too far back when turned the other way; thus, the instrument would register an unblushing falsehood. The longer the cross rod the greater would be the error. A careful man would apply a square in two, if not in four, positions and if the piece was correctly placed the square would lie still in all of them; if it were *not* correct the square would rock in any position but one.

The square is its own check. It would be impossible to make it lie. It would indicate error as promptly and unmistakably whether the error was in itself, the platen, or the setting. If it did *not* indicate error there would be no error.

Regarding limits of accuracy I believe any of my apprentices could set a piece to as close limits by the feel of two pieces of tissue under the blade of a square as any of Mr. Dixie's boys could by the dial gage.

Accurate work is the product of careful, conscientious workmen, not of elaborate tools.

What to Make in a Trade School

BY ENTROPY

When a group of men start a shop it is usually for the purpose of making money out of the manufacture of a certain definite line; usually something with which they are familiar, or something with which they have seen others successful. If these men undertake to start a trade school, either public or within their own shop, their natural tendency is to do the same thing: that is, to manufacture some machine or product complete.

When people in the educational business start a new school it is usually in response to a demand for the training of boys or girls along certain broad lines, so that the graduates may accept or be eligible for positions in widely varying vocations. Such men are inclined to the idea that the difference between general education and trade education is one of breadth only. Both the above classes of people will, or should, find that their viewpoint changes after they have been in the work a short time.

THREE THINGS AFFECT THE CHOICE OF WORK

There are three things which affect the choice of work to be done in the shops of a trade school: Policy; educational value; and production value.

The first is of real importance in order to avoid unwarranted criticism. There are always those who fear any new step. There are mechanics of the old school, who having learned their trades under the nearly forgotten apprentice system, are sure that the graduates of a trade school will be failures, and for no other reason except that it is not the way they themselves were brought up. Such criticism is not dangerous, because it is discounted by the rising generation.

There are those who see in every particle of productive work done in a trade school, some morsel of bread snatched from some workingman's family. Their criticisms are injurious, because they make martyrs of themselves, and martyrs are always dangerous.

Then there is the manufacturer of, say, engine lathes who imagines that if the trade school builds twelve lathes in a year that the profits on twelve lathes which he might have sold were taken from his pocket. There is a bare possibility that he is right, but he can usually be convinced that the supply of skilled men made available to him by the school will more than balance these profits; and he can usually see that there is the chance that some other builder

SPEED, PULLEY DIAMETER AND BELT SPEED

418.8	445.0	471.2	497.4	523.6	549.8	575.96	602.1	638.3	664.5	680.80	706.86	733.20	759.20	785.40	Belt Speed
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Dia., In.
R.P.M.															
800.0	850.0	900.0	950.0	1000.0	1050.0	1100.0	1150.0	1200.0	1250.0	1300.00	1350.00	1400.00	1450.00	1500.00	2
533.3	566.6	600.0	633.3	666.6	700.0	733.3	766.6	800.0	866.6	866.66	900.00	933.33	966.66	1000.00	3
400.0	425.0	450.0	475.0	500.0	525.0	550.0	575.00	600.00	625.00	650.00	675.00	700.00	725.00	750.00	4
320.0	340.0	360.0	380.0	400.0	420.0	440.0	460.0	480.0	500.00	520.00	540.00	560.00	580.00	600.00	5
266.66	283.33	300.0	316.66	333.33	350.0	366.66	383.33	400.0	416.66	433.33	450.00	466.66	483.33	500.00	6
228.57	242.85	257.14	271.42	285.71	300.0	314.28	328.57	342.85	357.14	371.43	385.71	400.00	414.28	428.57	7
200.0	212.50	225.0	237.50	250.0	262.50	275.0	287.50	300.0	312.50	325.00	337.50	350.00	362.50	375.00	8
177.77	188.88	200.0	211.11	222.22	233.33	244.44	255.55	266.66	277.77	288.88	300.00	311.11	322.22	333.33	9
160.00	170.00	180.00	190.00	200.00	210.00	220.60	230.00	240.00	250.00	260.00	270.00	280.00	290.00	300.00	10
145.45	154.54	163.63	172.72	181.81	190.90	200.00	209.09	218.18	227.27	236.36	245.45	254.54	263.63	272.72	11
133.33	141.66	150.00	158.33	166.66	175.00	183.33	191.66	200.00	208.33	216.66	225.00	233.33	241.66	250.00	12
123.07	130.77	138.46	146.15	153.84	161.53	169.23	176.92	184.61	192.31	200.00	207.69	215.38	223.07	230.77	13
114.28	121.33	128.57	135.71	142.85	150.00	157.14	164.28	171.42	178.57	185.71	192.85	200.00	207.13	214.48	14
106.66	113.33	120.00	126.66	135.33	140.00	146.66	153.33	160.00	166.66	173.33	180.00	186.66	193.33	200.00	15
100.00	106.25	112.50	118.75	125.00	131.25	137.50	143.75	150.00	156.25	162.50	168.75	175.00	181.25	187.50	16
94.11	100.00	105.88	111.76	117.64	123.53	129.41	135.29	141.17	147.06	152.94	158.82	164.70	170.59	176.41	17
88.88	94.44	100.00	105.55	111.11	116.66	122.22	127.77	133.33	138.88	144.44	150.00	155.55	161.11	166.66	18
84.21	89.47	94.73	100.00	105.26	110.52	115.79	121.05	126.31	131.58	136.84	147.36	152.63	157.89	163.15	19
80.00	85.00	90.00	95.00	100.00	105.00	110.00	115.00	120.00	125.00	130.00	135.00	140.00	145.00	150.00	20
76.19	80.95	85.71	90.47	95.24	100.00	104.76	109.52	114.28	119.04	123.81	128.57	133.33	138.09	142.85	21
72.72	77.27	81.81	86.36	90.90	95.45	100.00	104.54	109.09	113.63	118.18	122.72	127.27	131.81	136.36	22
69.56	73.91	78.26	82.61	86.96	91.30	95.65	100.00	104.35	108.69	113.04	117.39	121.93	126.09	130.43	23
66.66	70.86	75.00	79.16	83.33	87.50	91.66	95.86	100.00	104.16	108.33	112.50	116.66	120.83	125.00	24
64.00	68.00	72.00	76.00	80.00	84.00	88.00	92.00	96.00	100.00	104.00	108.00	112.00	116.00	120.00	25
61.53	65.39	69.23	73.08	76.92	87.07	84.67	88.46	92.31	96.16	100.00	103.84	107.69	111.58	115.38	26
59.26	62.96	66.66	70.37	74.07	77.77	81.48	85.18	89.88	94.58	96.29	100.00	103.70	107.42	111.11	27
57.14	60.71	64.28	67.85	71.42	75.00	78.57	82.14	85.71	89.28	92.85	96.43	100.00	103.57	107.13	28
55.17	58.62	62.07	65.52	68.97	72.42	75.87	79.32	82.77	86.22	89.65	93.10	96.55	100.00	103.45	29
53.33	56.66	60.00	63.33	66.66	70.00	73.33	76.66	80.00	83.33	86.66	90.00	93.33	96.66	100.00	30

beside himself might get the profits on a part, if not all, of these lathes if they had not been made by the trade school. He however has a claim which should be recognized.

The second consideration, educational value, is seldom met by the plan of manufacturing a given line such as would be profitable to a firm in business to make money. Take for example the thing that is done by more trade schools than any other: the building of a lot of speed lathes. There is very little work on these lathes for the beginner in the shop. He can rough out the turned parts, but there is very little drilling that he can do, and almost no milling or shaper work. The same is true of almost all other complete machines that can be made in a school that is teaching machine work. There is plenty of simple commercial work for the pattern and cabinet makers, but more schools offer, or attempt to offer, machine work than all the others combined and they are the ones toward whom this article is directed.

The educational requirement then, makes necessary a choice of work on which the beginners may have the desired training without roughing out so much work that the more advanced boys cannot possibly finish it. This is met in some cases by hiring journeymen machinists to complete the work begun by the students, but to do so is poor practice for political reasons and also because it injures the morale of the boys. So long as they see boys of their own kind, boys with whom they play baseball and go swimming, make a finished job of the work they have done, they expect to be able to do it themselves, but when they see grown men brought in to do it they become skeptical and when later they are given the job to do they fall down on it because of lack of confidence in themselves.

The third item, productiveness, needs little comment for the readers of this paper. If the product is not salable there is no way in which the boy can tell for a certainty whether his work is of value or not. He has seen favoritism practiced all through his school life and he expects to see it go right along. He has a very distinct idea that the best marks go to the best dressed boy, and to the boy that hangs around the teacher's desk just the right length of time to ask questions; but when he performs an operation on a part of a machine that must pass the inspection department of some shop a thousand miles away, he knows that no amount of blarney will have anything to do with it, and the job is accepted or not on what the gages say and on the finish that the inspector expects.

Taking all these things into consideration what is there for a trade school to make? There appears to be more than one solution. Those that I have found to be most satisfactory are the manufacture of parts of machines for other people and the repair, or rather rebuilding, of machinery. The first proposition presupposes that there are shops willing to let out the manufacture of detail parts and which have such a system of interchangeability that they can furnish gages to keep the work within definite limits.

Given such a shop, the next thing is to select such parts as require much more work which beginners can do than the more skilled work of completing the job.

The principle that the job must be finished by students is however one to which it is wise to adhere. If a hundred boys enter a school in a given class it is almost certain that but seventy-five will appear the second year, about sixty the third and fifty the fourth year, these last being the ones who will have to put the finishing touches on the completed job.

In addition to this I have found the rebuilding of machinery to be of the greatest possible value, not only for the actual work but because there is no better time to observe the value of good design than after it has been well tested out. Rebuilding should be done, not as a repair job but as a matter of good design, building up the strength of parts which have been broken and increasing the wearing surface in parts that have suffered the most. Steel gears in some instances may be substituted where the proximity of other parts will not allow of increased sizes and hardened steel for studs and shafts that have shown more than their share of wear. The very ingenuity with which these changes of design are made appeals to boys and sets them to thinking for themselves.

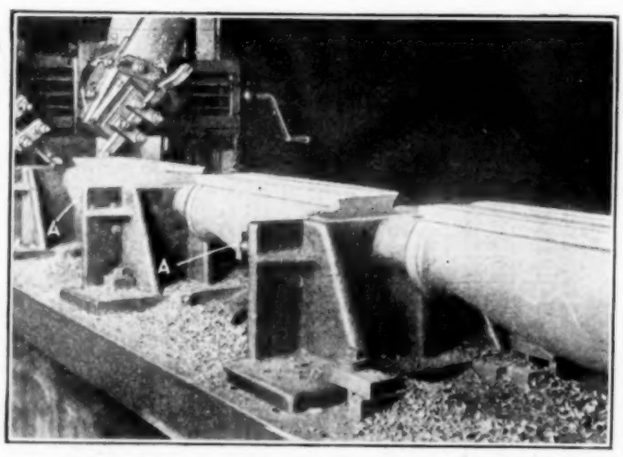
Neither of these methods violates any policy that will bring a school legitimate enemies. The parts which are made for other concerns may be sold for cash or exchanged for machinery needed for the school. The rebuilt machinery should usually be used in the school for a time, at least, as an object lesson and then exchanged or sold. There is always need of new equipment in a live school, even if for no other reason than to keep up with changes in the design of commercial machinery.

Fixture for Planing Grinding Machine Columns

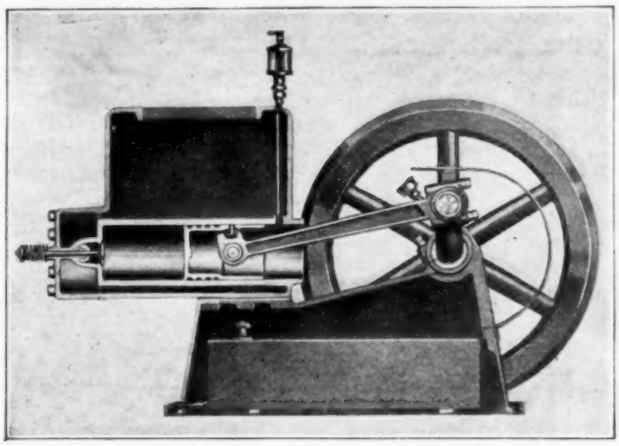
BY J. H. VINCENT

Work-holding fixtures are used extensively in the plant of the Oakley Machine Tool Co., the accompanying illustration giving a good example of how the work is handled in the planing department there. The castings shown on the table are columns for a toolroom grinding machine, three of them being held at a time by four fixtures of the type shown, while the vertical ways are being planed.

The fixture is so designed that one side supports the flat base of the column, which is fastened to it by the clamps *A*, and also takes the thrust of the cut. A large circular boss on the other side fits into the small end of the next column casting, thus providing a solid support. Removing and replacing castings can be done easily and quickly.



PLANING FIXTURE FOR HOLDING GRINDING-MACHINE COLUMNS



The Manufacture of Single-Cylinder Gasoline Engines

By J. V. HUNTER

Western Editor, *American Machinist*

If present indications are any guide to the future of the gas-engine industry, the next few years will witness remarkable strides in the commercial development of this source of power. The following article details many of the machining methods of one very successful manufacturer of gas engines.

THE Fuller & Johnson Manufacturing Co., Madison, Wis., has for many years, specialized and successfully manufactured a varied line of single-cylinder type gasoline engines which meet the demand for small and moderate sized power units. By confining its efforts to a few standard sizes, this company has been able to produce engines on an interchangeable-part basis which not only facilitates the work in its own plant but makes it possible to render the users quick service in the matter of repair parts.

In studying the methods employed in manufacturing these engines, we may well start with the machining of the engine base. In some types of engines covered in this article, the base serves as a support for the combined cylinder and water hopper and main bearings in one series,while in others, the cylinder, water hopper and main bearing supports are cast *en bloc*. The preliminary machining operations on the first-mentioned type base are shown in Fig. 1. The base is set up on an open-side planing machine and the cylinder supports, main bearing blocks and minor surfaces on the frame are finished-planed.

The mounting screw holes for the upper works of the engine are next drilled in the base. A heavy cast-iron jig, Fig. 2, of ribbed construction is used to locate the holes. The jig is positioned by means of stops mounted in the C-clamps *A* which bear against the machined surfaces of the main bearing blocks as gaging points. The jig is held in place by means of the hook bolts *B*.

In this plant the babbitting operations on the main bearings follow the drilling. The babbitting jig used for this operation is shown as applied to the base of a medium-sized engine, Fig. 3, and shows the pins *A* which locate it for position and height so that the mandrel *B* will give the correct thickness of babbitt throughout the full length of the bearings. The babbitt is prevented from running out on the ends by the flanges *C* which are held in place by the thumb nuts *D*. The molten metal is poured through the holes *E*.

One of the drill jigs for drilling the main-bearing cap-mounting screw holes is shown in the illustration, Fig 4. The jig is aligned in correct position by means of the babbitted crankshaft bearings.

Machining the Cylinders

The methods of machining the cylinders vary, depending upon the size of the engine. The larger units, which are not made in large quantities, are handled by methods requiring fewer special fixtures than are used for the smaller engines manufactured in greater numbers. A large cylinder is shown being bored on a horizontal boring machine, Fig. 5, using a special fixture *A* for holding the base of the cylinder, and clamping the crossbar *B* which extends over the water hopper *C*. A somewhat similar cylinder is shown clamped to the table of a Gisholt vertical boring machine, Fig. 6, for finishing the surfaces *A* and *B*. The upper end of the cylinder is steadied and supported by a bushing which fits in the

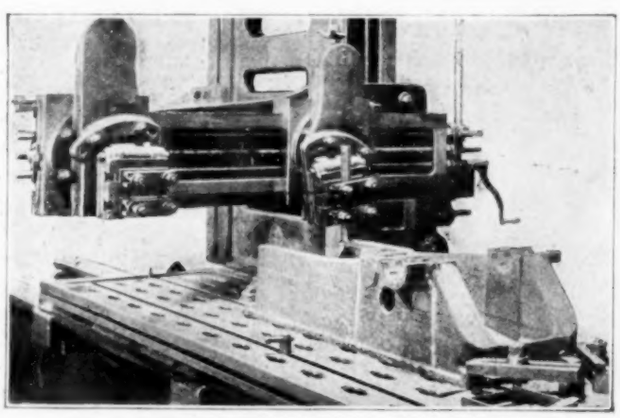


FIG. 1. PLANING A GAS-ENGINE-BED CASTING

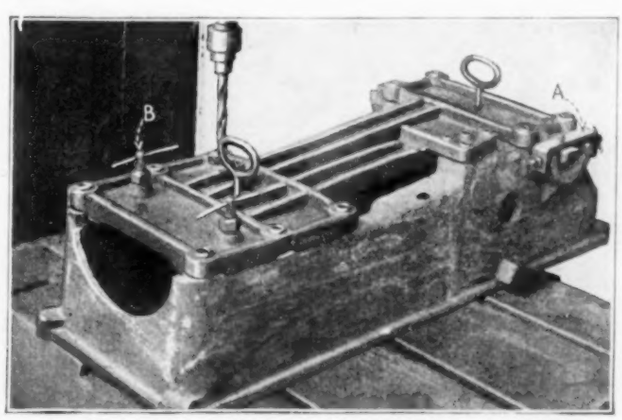


FIG. 2. DRILL JIG COVERING TOP FACE OF ENGINE BASE

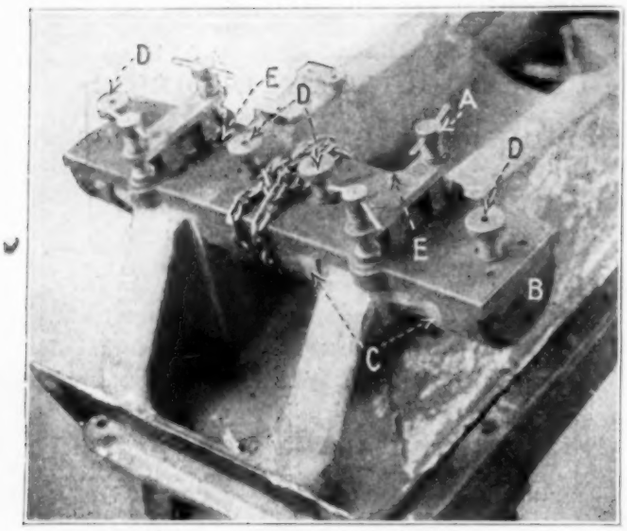


FIG. 3. BABBITTING CRANKSHAFT BEARINGS

bore of the cylinder and revolves on the spindle *C* held in the toolpost *D*.

Another type of cylinder is bored and reamed in a special Gisholt machine which has been fitted with a combination fixture and carriage *A*, Fig. 7. The main spindle is used to drive the boring bar *B*, which carries interchangeable cutters and reamers. After a rough cutter has been passed through the bore, the reamer *C* is put on the bar and a finishing cut taken. The accuracy of this reaming has not been questioned, and so far it has been found unnecessary to internally grind these bores.

A rather remarkable method has been devised for boring and finishing some of the smaller cylinders. The casting *A*, Fig. 8, is held in the large fixture *B* which is mounted on the live spindle of a turret lathe. The various tools required for boring and reaming the cylinder and facing the ends are carried on the turret head of the machine. One of the finished castings is shown at *C*.

A special Gisholt machine has been fitted up for facing the base of the cylinder and drilling the mounting holes in one set-up. The cylinder *A*, Fig. 9, is held in a fixture fixed to the lathe carriage. This fixture is provided with a mandrel which fits the finished bore and aligns the cylinder for the facing and drilling operations. The facing operation is done by the large inserted-tooth milling cutter *A*, shown in Fig. 10, which is mounted on the main spindle of the machine. The drilling of the holes is accomplished by the attachment *B* built on the headstock. This device contains six drills correctly spaced and guided by the bushed frame *C*. The frame is mounted on the sliding studs *D* and held against the work by springs. When the holes are drilled through,

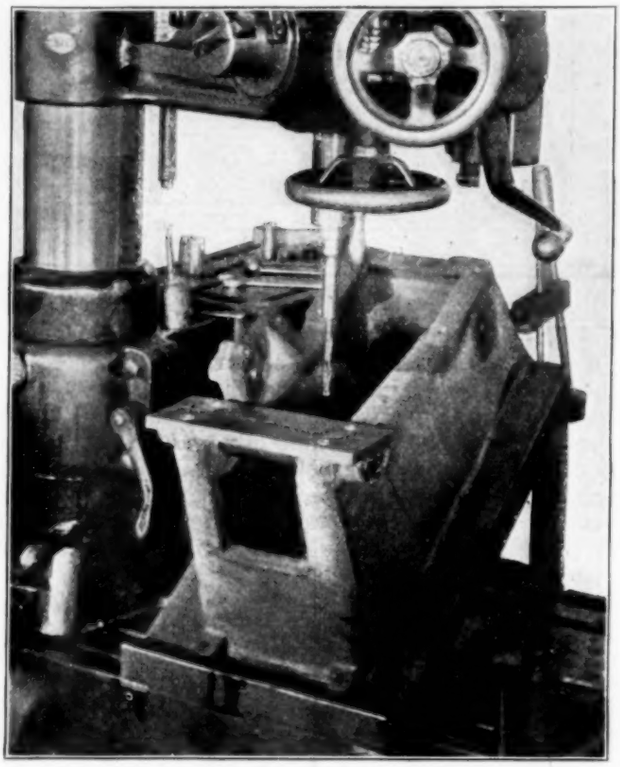


FIG. 4. DRILL JIG LOCATED BY BABBITTED BEARINGS

an automatic device trips the feed and reverses the carriage.

For drilling the small combination engine base and cylinder units, similar to *A*, Fig. 11, a rather unique jig is used. The cylinder *B* is mounted and positioned on the mandrel *C*, while the drill is guided by the bushings *D*. The small jackscrew *E* is used to support the sides of the casting during the drilling operations. Greater detail of this jig may be seen in Fig. 12. Pulling out the stud handle *A*, permits detail *B* to be slipped from the mandrel, thus allowing the easy removal of the cylinder. The leaf *C* is held in position by the pin *D* and when not in use swings upward which allows further quick loading and unloading of the jig.

In the same setting certain counterboring and facing operations on the bosses are performed. In order that the operator may know exactly how far to lower the spindle during these oper-

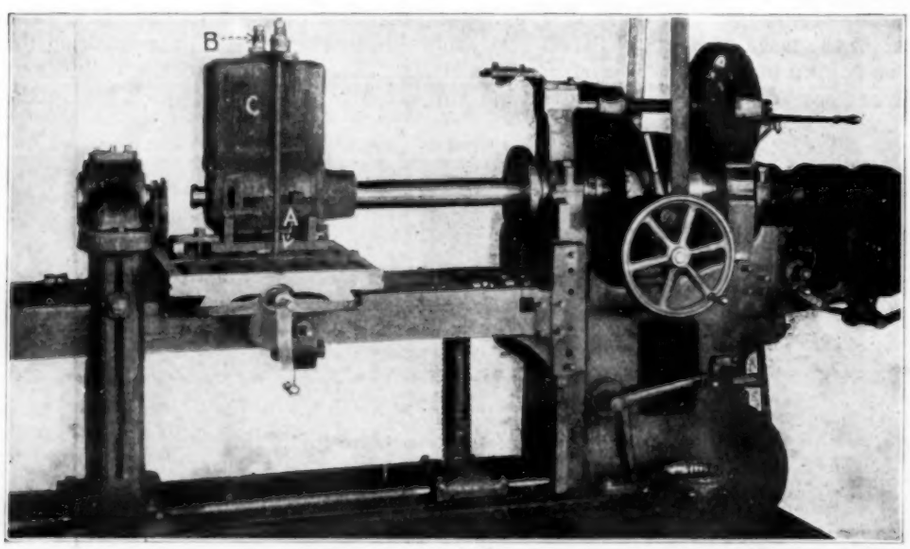


FIG. 5. BORING LARGE ENGINE CYLINDER ON GISHOLT HORIZONTAL MACHINE

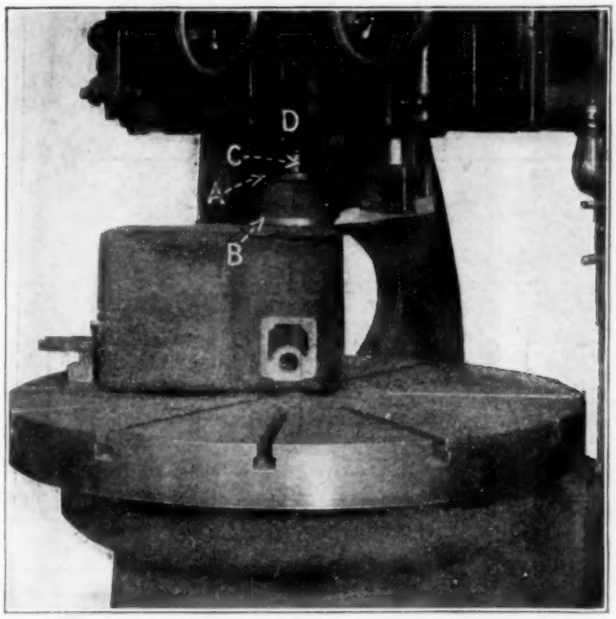


FIG. 6. TURNING OUTSIDE FLANGES OF CYLINDER

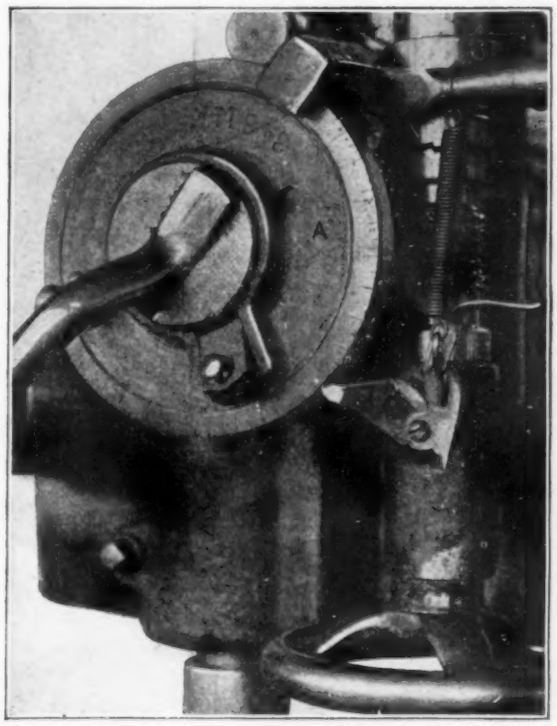


FIG. 13. DISK FOR DETERMINING DEPTH OF COUNTERBORING

ations, the shaft handle of the spindle feed rack has been fitted with a graduated brass dial *A*, Fig. 13, one complete revolution of the dial, which is graduated in 16ths, indicating a feed of 5 in. of the machine spindle.

A very serviceable fixture *A*, Fig 14, is provided for handling a drilling jig under a Fox multiple drilling machine.

The base of this fixture has two ways *B*, upon which a saddle *C* slides. This saddle is pulled back and forth by means of the continuous chain *D* which is driven over a socket by the handle *E*. The fixture is drawn to the front of the machine and the cylinder slipped over the center mandrel. This brings the base of the cylinder inside of the flange *F* which is then aligned and held in place by driving in a long taper wedge *G*. The saddle is then disposed in correct position under the drills by an indexing pin. The drills are guided by the jig plate *H* which slips over the end of the center mandrel and is held in place by a pin *I*.

After the holes are drilled the jig plate is removed and the saddle pulled back until caught by a second indexing pin which lines the cylinder up with the three tapping spindles *J*.

The cylinders of the larger types of engines are given a hydrostatic test at 100-lb. pressure to insure against the possibility of leakage Since the engines are cooled by the water-evaporation method, the hopper *A*, Fig 15,

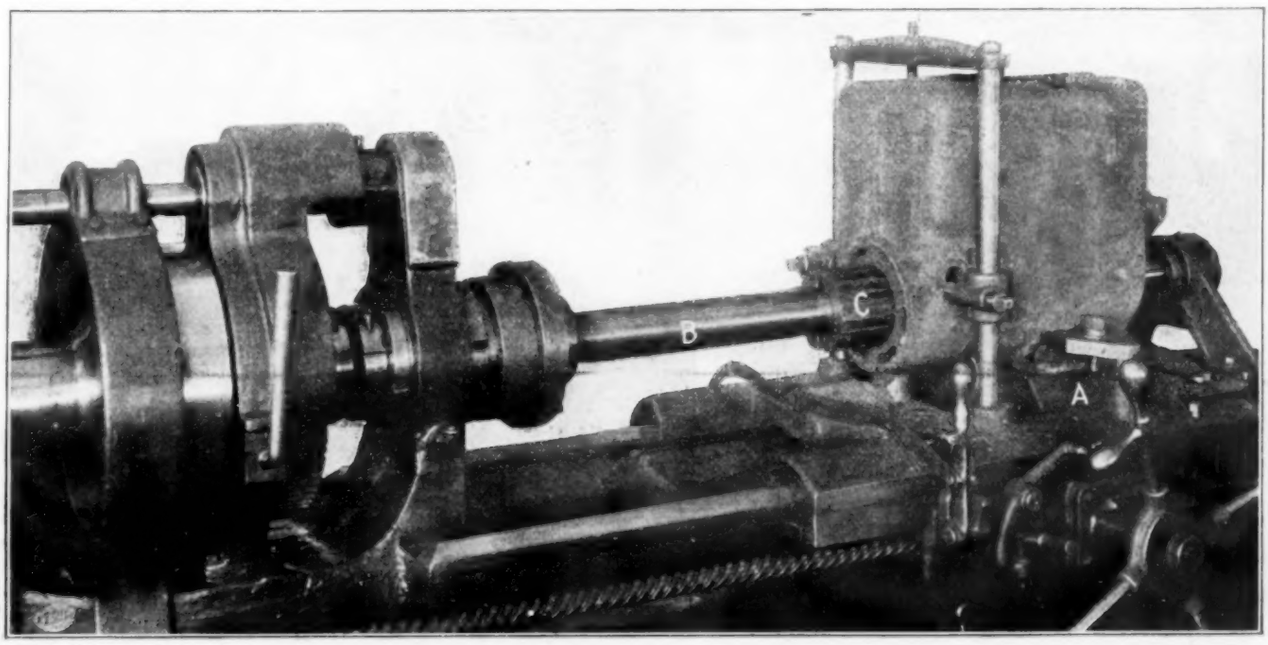
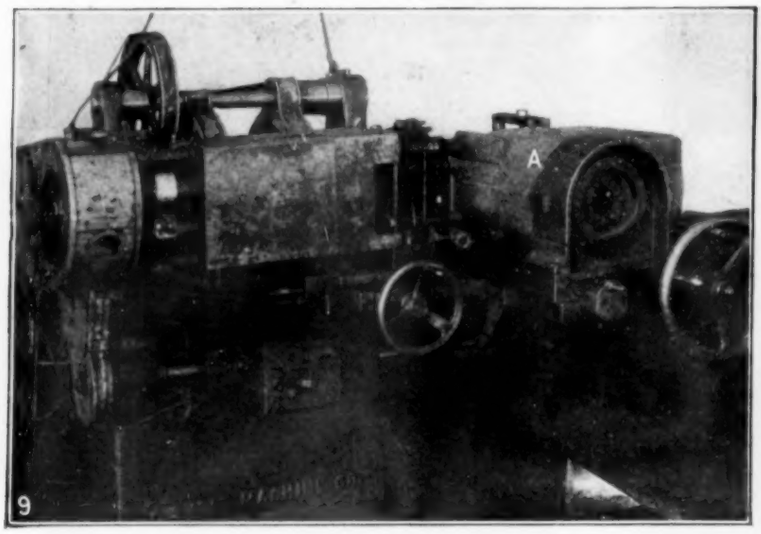
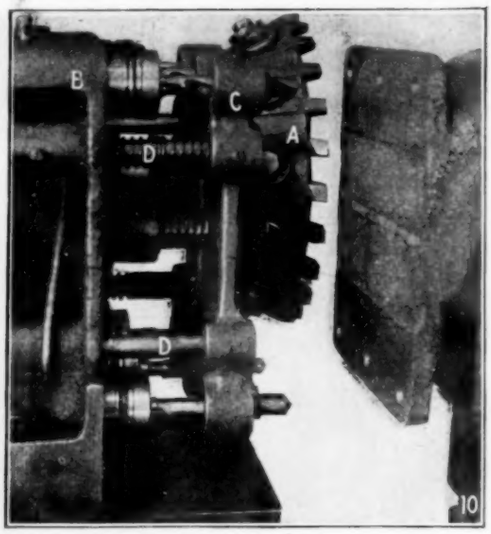


FIG. 7. SPECIAL MACHINE FOR BORING AND REAMING CYLINDERS





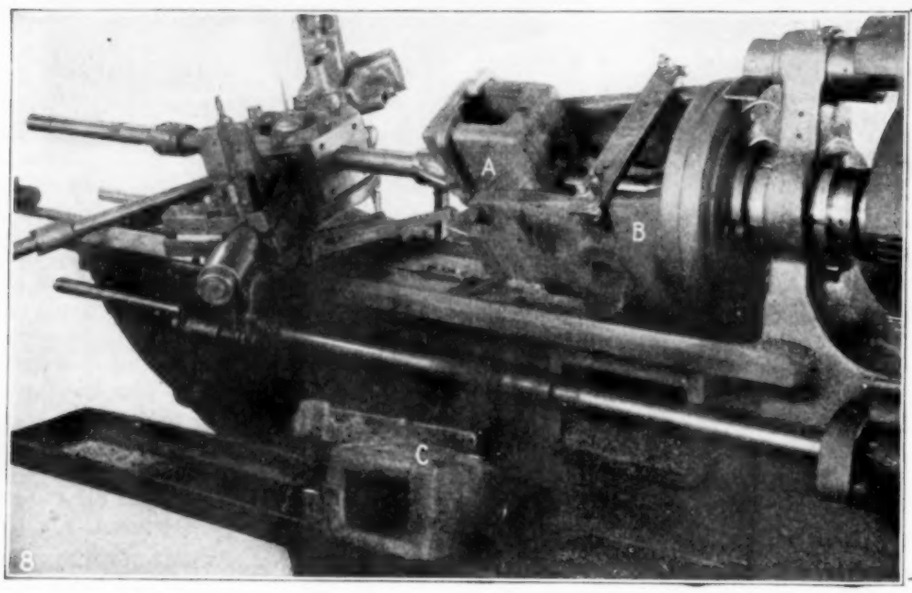


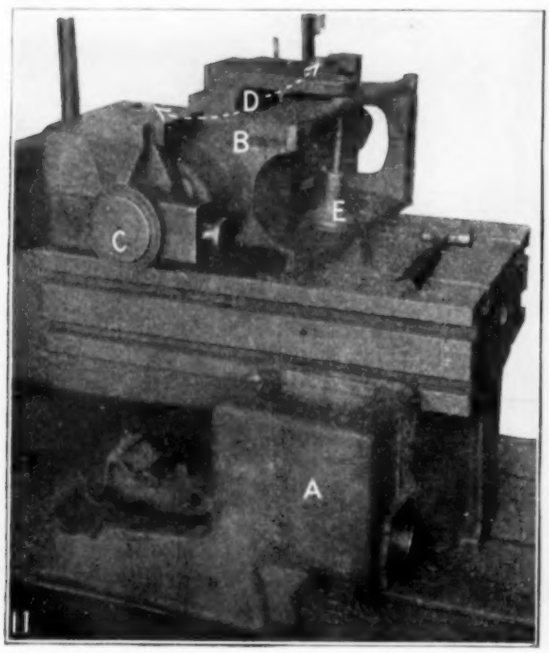
FIG. 8. BORING SMALL CYLINDERS ON GISHOLT TURRET LATHE

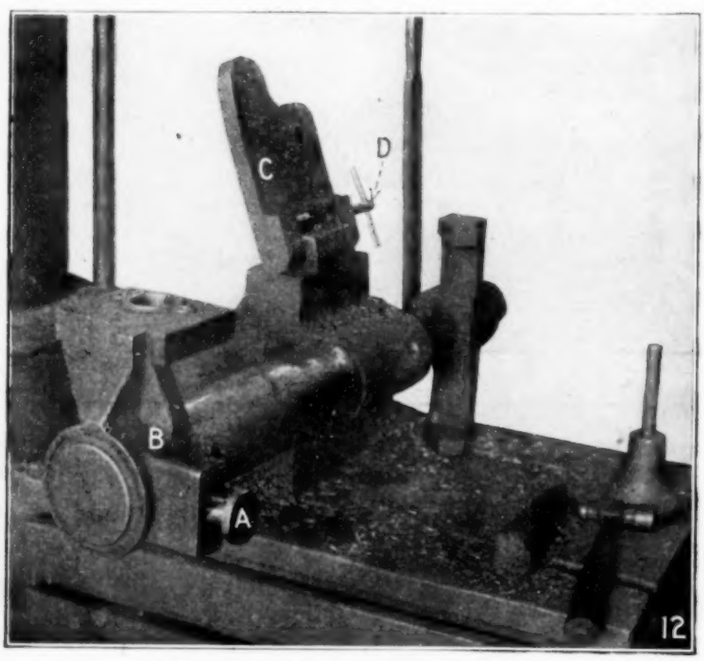
FIG. 9. MACHINE FOR MILLING AND DRILLING CYLINDER BASE

FIG. 10. DETAIL VIEW OF MILLING AND DRILLING FIXTURE

FIG. 11. JIG FOR DRILLING BASE OF SMALL ENGINE CASTINGS

FIG. 12. THE JIG SHOWN IN FIG. 11 AFTER REMOVAL OF CASTING





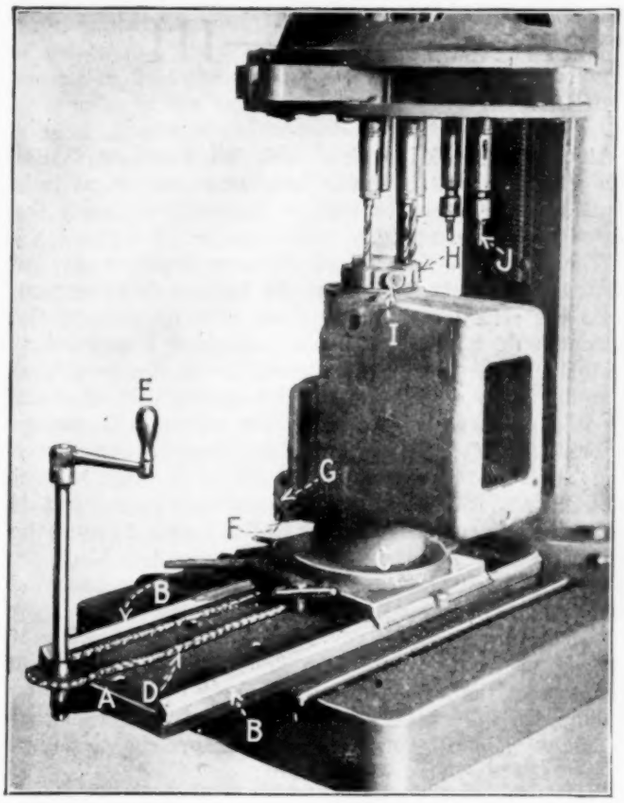


FIG. 14. SLIDING SADDLE FOR SUPPORT OF DRILL JIG

in which the cooling water is evaporated by the heat of the engine, must be tested at the same time. It is closed during the test, by a large plate and gasket *B*, in which are provided both the water inlet and air escape cocks and similarly both ends of the cylinder are closed by large flanges and gaskets *C*.

An Automatic Drill-Releasing Device for Barrel Drills

By Jack Finlay
Lithgow, N. S. W., Australia

The illustration shows a releasing drill holder used on the P. & W. barrel drilling machines in the Commonwealth Small Arms factory in New South Wales. The device has been in use here for about six years, having been designed by A. C. Wright, now associated with the New England Westinghouse Rifle plant.

The body *A* of the device is of cast iron, to which is attached by fillister-head screws not shown in the drawing, the steel shank *B*. This shank fastens to the saddle of the drilling machine and its threaded end receives the fittings attaching it to the high-pressure oil supply.

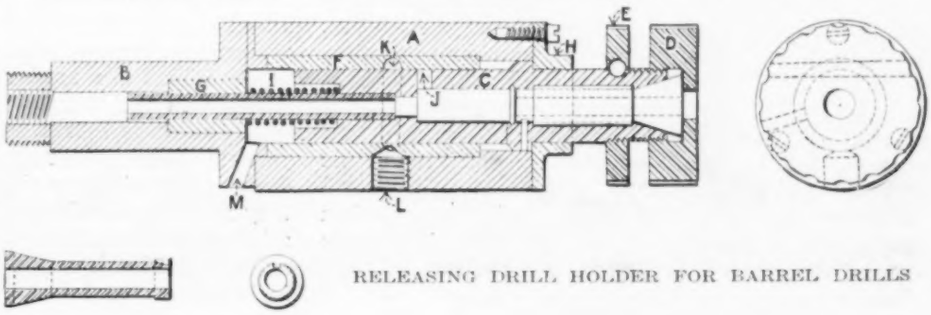
The part *C* is of mild steel, case-hardened and ground all over, and is the part which receives the shank of the barrel drills. These fit in the tapered hole at the outer end, and are held by the ring nut *D* and a key in the smaller end. A knurled ring *E*, pinned to part *C*, holds it against the effort required to tighten the nut *D*. Bronze bushings *F* and *G* are pressed into the body and

FIG. 15. TESTING CYLINDER CASTINGS FOR LEAKAGE

shank. Very accurate work is necessary in sizing these bushings and part *C*, for the reason that while the latter must turn in the bushings the joint must be capable of holding oil at the enormously high pressures used in this work.

A collar *H* fastens upon the outer end of the body *A* by means of fillister-head screws and abuts against a shoulder on part *C*. The friction of this joint (between the shoulder on *C* and the collar *H*) is what holds the drill from turning. The coil spring *I* holds these faces normally in contact, but it is the oil pressure—in these machines, something like 600 lb. per square inch—against the small end of *C* that furnishes the real holding power.

So long as the drilling is proceeding satisfactorily there is no relative movement of the parts, but if a drill "bugs" in the barrel it overcomes the frictional resistance and begins to rotate, carrying part *C* with it. As the saddle of the machine continues to advance, part *C* is pressed back against the pressure of the oil and the action of the spring *I*, until the hole *J* in part *C* coincides with the annular chamber *K* in the bushing *F* and oil under high pressure escapes through hole *L* and thus to a pressure-operated kick-off which stops the machine. The operator, his attention called by the stoppage of the machine, shuts off the oil and releases the clogged drill. A small drain hole *M* in part *C* provides for the escape of any oil that may leak past bushing *G* and thus prevents accumulation of too great pressure upon the frictional driving surfaces.



RELEASING DRILL HOLDER FOR BARREL DRILLS

Knowing Your Insurance Policy—III

By CHESLA C. SHERLOCK

The premium paid on a policy should be proportionate to the risk, and if the risk should change the premium rate should change. This merely provides protection to the insurer. The method of payment of premiums, particularly in regard to the troublesome question of promissory notes, is fully treated. The importance of a clear and definite agreement between the insurer and the assured cannot be too strongly emphasized.

(*Part II appeared in our May 13 issue.*)

MUCH of the litigation that arises in regard to insurance contracts grows out of the agreement concerning the premium, the payment of it, or the failure to pay, and the multitude of questions which surround all of these considerations. The premium is in fact, the very backbone of the contract and it is here that we find most of the legal questions arising under insurance contracts centering.

Emerigon, an early authority on insurance, defines it as follows: "The premium is the price of the peril against which the insurer guarantees in case of accident to the subject insured. . . . It is the cost of insurance. The word premium comes either from the word 'praemium,' signifying 'price,' or from the word 'primo,' because formerly the premium was paid before all and at the time of signing the policy." Anderson, another authority, gives it this definition: "The sum paid for undertaking the risk in a contract of insurance."

Importance of the Premium

It should be remembered in the first place that the premium is the real reason for the insurer undertaking the risk; and in one sense it may be said to be the real reason for the contract of insurance itself, although, from the standpoint of the assured, the real reason is the need for protection from the risk. Since it is one of the very important or pivotal reasons for the existence of the contract of insurance itself, the law has been very jealous of it, both in placing safeguards around it, and in protecting the respective interests of the parties concerning it.

In the first place, it is required that the amount of the premium or the rate per cent shall be shown in the face of the policy itself. While it has long been held that it is not absolutely necessary for the parties to expressly agree to all the details of a written and printed contract such as a policy of insurance always is, the courts have held that the premium amount is such an important element of the contract of insurance that it must be expressly agreed to, in order to validate the contract. There is this important exception, however, that, if the premium amount, or the rate, is not expressed, it must be possible from the terms of the policy or contract itself to ascertain with reasonable certainty what it is.

Emerigon has said: "If there be neither a premium stipulated nor implied, it is certain there is not the whole of the contract or that it is a contract of quite a different kind from insurance."

It is well settled at law that the premium is not due until the risk to the insurer attaches; or, as it is usually stated, the contract is not in force until the premium has been paid.

The premium is part of the consideration of the contract. In fact, so far as the insurer is concerned, it is the consideration, and those who understand the elements of a valid contract know how important it is to have the proper consideration. If the consideration is inadequate or fails, the contract itself fails. It is a well-known fact that the courts will declare a contract of no force or effect, merely because of the lack of proper consideration. So it is in respect to the contract of insurance. Since the premium in this sense is the consideration, it follows that it must be adequate or the contract of insurance will fail.

This is the first important fact to bear in mind concerning insurance premiums. If the policy does not meet these conditions regarding premiums, or if the agent in his anxiety to do business attempts to circumvent the evident intent of the law, have nothing to do with the matter if you desire the protection that is at the basis of every attempt to secure such a policy.

The Element of Risk

The premium must correspond at all times to the risk. If the risk increases, then the premium must increase. Business men may be surprised at this statement, but it is grounded in ample authority. Joyce, one of the leading authorities on insurance, says: "But the premiums must grow higher as the risk increases; for, as we have before noted, the division and the distribution of liability among a large number of persons subjected to like risks minimizes the loss, and the premium must be such that it will be safe for the company to insure, and not so large that the insured cannot afford to effect a policy; so that although the insurer may undoubtedly assume the risk without any conditions upon the assured, the premium being the sole consideration, nevertheless it is for the benefit of all parties concerned that the risk be not increased during the term of insurance. An increase of risk which is substantial and continued is a direct and certain injury to the insurer, and changes the basis upon which the contract of insurance rests."

The courts long ago wisely adopted the rule that the premium should be sufficient to make it safe for the company to insure, but that it should not be so high as to prevent the assured from accepting the policy. Joyce states: "The rate of the premium should be so computed, and an adequate premium demanded, that the insurer can safely assume the risk and the assured may afford to insure." The courts have never attempted to concern themselves with rate-fixing, and we believe wisely. That is a matter entirely on the side and not involved in the broad legal principles governing such contracts. The courts have required, though, that the parties shall agree upon a rate and they have laid down, with legislative aid, certain restrictions as to how they should reach that agreement, but they have never attempted to enter the field of rate-fixing.

But one thing is very certain, and it should be written in letters a mountain high. This is that the assured,

seeking protection for his property against a certain risk, cannot increase the hazard after he has secured a policy and paid a premium on a given risk, and expect to hold the insurer liable for any damage that may arise to the property from such increased risk.

It is a fundamental proposition in the law of contracts that the entire liability of the parties rests in the meeting of the minds of the parties, presumably as expressed in the written instrument. If the parties to an insurance contract agree that the risk is such and such and that the premium on this risk is so much, that and that only is the basis of their contract. So long as the facts remain this way the parties will be absolutely bound according to the policy.

But the insurer never contemplated that he should be bound in like fashion in case the risk should be increased two-fold, we will say. He assumes that the risk will remain the same and he has a right to make this assumption. He assumes, and he has the right, that in case the risk is increased that the assured, if he has no way of preventing it, will promptly inform him and a new contract covering the new situation will be drawn up, and the increased premium on the increased risk paid.

Violation of Contract by Change of Risk

This is just what the law intends that the parties shall do; or else it assumes that they understand that, the essence of the old contract having failed, it is no longer in force and effect so far as the increased risk is concerned. Says the Connecticut court, in this connection: "The insurer undertakes, for a comparatively small premium, to guarantee the assured against loss or damage upon the exact terms and conditions agreed upon."

The stipulations and the conditions of an insurance contract are deemed a part of the consideration of such contract and the non-observance by the assured of these stipulations and conditions, or a failure by him to perform them, will release the insurer. Business men seldom stop to think of this important fact or to realize how often, in the course of a year they are really without insurance protection at all simply because they have failed in their legal obligations under the contract.

Says an Iowa case: "A contract of insurance, though unilateral in form, may contain covenants of the assured as well as of the underwriters and mutual agreements of the parties, and some of the covenants may be in the nature of warranties and conditions precedent on the part of the assured, while others may be in the nature of obligations imposed by conditions limiting or measuring the underwriter's liability. The covenants of the insurers are, for the most part, if not entirely, dependent upon the covenants or obligations of the assured, expressed or implied in the policy; and even though the policy is subscribed only by the underwriters it evidences the contract entered into by both parties."

In fact, it is a general rule among the authorities that the premium is the essence of the contract of insurance. One authority states: ". . . the premium paid by the assured and the peril assumed by the insurer are two correlatives, inseparable from each other. Their union constitutes the essence of the contract."

While the courts do not concern themselves with rate making, they are concerned that the rate shall be equitable and reasonable in view of the risk. Emerigon has said in this respect: "An equality is to be preserved between the premium paid the insurer and the peril for which he makes himself responsible. . . . The premium, says Pothier, to be equitable, ought to be a fair price for the risks which the insurer assumes."

Arnould, an authority on marine insurance, has said, speaking of this point: "The underwriter pays no loss except with reference to the sum on which he is paid a premium; the whole sum, if the loss be total, some aliquot part of the sum if the loss be partial."

Importance of the Original Agreement

Since the courts will have none of the matter of agreeing as to the reasonableness of the rates, other than to deal in specific cases and determine them on principles, they have adopted the rule that the agreement between the parties as to the rate shall govern and it will be presumed to be reasonable until contrary showing is made. In fact, in the vast majority of the cases, the agreement between the parties as to the rate will govern absolutely and the courts will not interfere with it.

In fact, one of the very first authorities on this point said: "The rate agreed upon by the parties must be taken to be a just one. . . . If at the outset the nature of the risk has been fully declared, the insurer will not be permitted to dispute the payment of the loss under the pretext of the smallness of the amount of the stipulated premium."

The fairness of this rule should appeal to all. If the assured be required to maintain the same risk or peril that he agrees to in the beginning, then there is nothing unfair in requiring that the insurer shall be required to stick by his guns and make good on the basis on which he was willing at the time to assume the risk and enter into the contract.

Most of the states have laws in which it is declared to be illegal for the insurer or his agents to discriminate in regard to rates or to offer rebates to certain persons as an inducement to insure. This is only a desire to maintain a fairness in rates to all parties concerned, to guarantee an adequate rate to the insurance company on every risk and to guarantee to the assured that he will have the maximum protection at the same price that others are paying for it. It is not, however, a discrimination to offer to rebate, if the matter goes no further than that, nor is it a discrimination to require that one seeking a mortgage loan of a company should take out a life insurance policy with the company.

Method of Payment of Premium

The payment of the premium must be in accordance with the terms of the policy or contract. If certain stipulations are contained in such contract, they govern the manner of payment, regardless of any parol understanding that the assured and the agent of the insurer may have. May, an authority, states: "When no special mode of payment is stipulated for, any mode of payment which is accepted without objection on the part of the insurer or their agent, will suffice." This seems to be generally accepted in custom, although some of the courts have been disposed to question the broadness of the assertion that "any mode of payment" would suffice. In fact, it has been held in some states, notably New York, that an insurance company may make a valid contract without requiring payment of any premium.

It is a general rule that where the policy calls for

the payment of a certain sum annually that it is to be paid in advance and not at the end of the year, although there is nothing to prevent the parties entering into a contract to the contrary. In fact, many of the marine contracts are payable only at the end of the voyage, when the ship has delivered its cargo.

Annual premiums payable in advance are not a debt, although the premium may be in some cases enforceable as a debt by the insurer independent of the forfeiture of the contract itself. In one case, it was said: "It (the company) could not have sued and recovered from him that or any subsequent year's premium; its remedy was provided against the insured by the forfeiture of all of his money previously paid and the rights under the policy."

It has been held again and again that a mere agreement to pay a premium when due is not sufficient to prevent a forfeiture of the policy. In fire and marine contracts it is generally held that the payment of the premium is not generally a condition precedent. Failure to pay on the day stipulated forfeits the policy and the rights thereunder.

The Payment of Premium by Note

The widespread use of the promissory note in the payment of insurance premiums has raised many questions as to whether or not it amounts to "payment" within the meaning of the policies and of the law. It is a general rule of law that the insurance company has implied power to accept promissory notes in payment of premiums. It was held in a Kentucky case that such payment was good even though the policy provided for payment in cash.

In an Oregon case it was held that an agent cannot, without authority therefor, receive payment of premium notes which he has received and sent to the insurer. And in Kentucky, it was held that if the insured gives a note for the first premium payable to the agent as "agent" and this is accepted by the company, it is a note received for the premium, and its nonpayment at maturity forfeits the policy, the latter stipulating that if notes for premiums should not be paid there shall be a forfeiture. It was also held that the ruling was not changed by the fact that the agent had receipted for the premiums as for a cash premium paid.

It has been held again and again that a note is not payment where it is expressly stipulated that the agent has no power to extend credit or time of payment of premium. In Maine it was held that a partnership is not bound by a note given by a member of the firm in the firm name for the premium on the insurance of such member's property, such act not being within the scope of the partner's authority to bind the firm. And in Michigan it was held that if a note is given and a receipt issued that it is sufficient payment to prevent forfeiture. A number of cases hold that there is a waiver of actual payment of the initial premium where the insurer accepts notes therefor, delivers the policy and gives a receipt stating that the premium has been paid by notes.

It is well settled that the acceptance of a premium note operates to put the policy in force from date of acceptance and that the agent is, in case of nonpayment of note, liable therefor, and that the note is to be deemed as so much cash. Where the agent pays the premium and takes the note of the assured, the courts hold that this amounts to a loan on the part of the agent to the assured.

It may, however, be stipulated that the note is not payment of the premium but merely an extension of time, and if not paid when due the company is not liable for the period that it remains unpaid. In a Wisconsin case, it was held that a condition is valid in a mutual company policy that if a note taken for a cash payment is not paid within sixty days after due, "all obligations of the company to the insured until such note is paid are suspended."

In a New York case, the court said: "But in this case it is plain that the policy provides for a lapse of it upon the mere nonpayment of the annual premium, and for a like lapse upon the mere failure to pay at the maturity any note given like this for an accrued premium; and it is plain that the parties intended that these provisions of the policy should apply to and control that part of the transaction between them represented by the giving and the taking of the note, and the extension thereby of the time for the payment of the premium.

"It is just as much the case with the contract embodied in the note as the contract embodied in the policy, that one of its conditions was that a mere omission to pay at maturity did not cause the policy to be void. The taking of such note as a means for providing for the premium was contemplated by the policy, and hence by the parties at the inception of their relation of insurer and insured, and therefore the payment of it at maturity was a consideration precedent to the continuance of the policy, for so are the terms of the policy in reference to it, and so are the terms of the note itself."

Summary

We have found, then, that the premium is the very essence of the insurance contract and that it is a correlative of the risk and inseparable from it.

The premium must at all times be adequate to the risk and the risk must not be increased so long as the premium remains the same, else the contract will fail for failure of consideration.

The manner of the payment is not so important, although the terms and stipulations of the policy will generally govern within reasonable bounds. The point is that the manner of payment is left entirely to the agreement of the parties at the time they enter into the contract, and they must make payment according to such agreement.

Notes, or any other form of payment, may be accepted and made, upon agreement of the parties, and ordinarily they will be considered as so much cash, unless a contrary arrangement is made at the time.

Maxims of the National Safety Council

Safety is the corner-stone of efficiency. The more safety the less worry—the greater efficiency.

In office, bank, factory, on the railroad, or in the mill the most valuable man is the careful man.

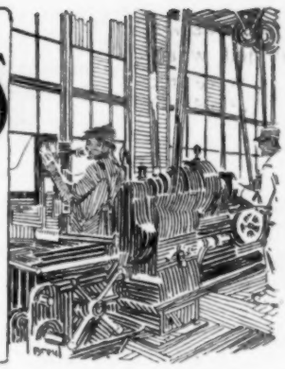
Safety First is more than philanthropy. It has now become a fundamental factor in the economics of business.

A preventable accident is a disgrace to the foreman in whose gang it happens.

A good workman at his best makes a poor doctor. Do not trust him. Go to the doctor.

MODERN PRODUCTION METHODS

By
W. P. Basset
of
Miller, Franklin, Basset & Co.



PERHAPS not even a majority of machine shops have set aside office space which they dignify as "the engineering department." But in most shops it is safe to say there is someone who, as part of his duties at least, does some preliminary engineering of the product. For simplicity's sake, therefore, I shall use the term "engineering department" in this article.

In small job shops even today, the customer will sit down with the shop's foreman and describe the device he wants made—perhaps amplifying his ideas with a rough sketch. The foreman passes these ideas on to the pattern maker and to the various machinists who build the device, solving their own problems of design, tooling and so on, as they come up. Until planning began to develop, that was the general practice. In these shops, however, where production is highly planned, nothing is left to the discretion of the shop; it needs only to follow the directions issued to it. Every step has been engineered. Between these two extremes nearly every degree of preparation by the engineering department may be found.

Part IV—Engineering the Product

The importance and power of the engineering department of a manufacturing enterprise is apt to vary directly with the size of the concern, and within wide limits. Here the general principles governing the conduct of a well-organized engineering department are laid down in a sane and conservative way.

The function of the engineering department is to study the product and the shop processes so that the design and manufacture may be most economical. It acts as a road roller, smoothing the way of the manufacturing departments. Completely accomplished, the factory will have nothing to do but perform productive work on the product. Methods will be previously determined for them.

Functions of Engineering Department

This function divides into two general classes; first, designing the product and the tools with which it will be made; and second, furnishing the data which the planning department will use in planning the production.

In some shops, of course, it is not feasible to plan the production in detail. It would be possible but not sensible. Strictly speaking, a job shop about to build a special intricate machine, which it has never made before and may never make again, *can* plan every step of the making. But the preliminary planning itself would cost more than could be saved. I only favor planning when it increases profits. It is only, as a rule, when a product, with only slight changes, is to be run in quantities that the refinements of planning pay.

Although it would obviously be foolish to plan the manufacture of a single special machine in detail, the engineering department may even here prepare the way to a certain degree, leaving much to the discretion of the men in the shop.

Among the duties of design which devolve upon the engineering department are the following:

1. To adapt the product to its use.
2. To so design it that material will not be unduly wasted.
3. To prevent labor waste due to designs which are clumsy to machine or to handle.
4. To specify raw materials and test when necessary.
5. To design the tools, jigs and fixtures which will best serve.
6. To make as many parts as possible interchangeable among several assemblies.
7. To design special machines needed by the shop and to consult on the purchase of new machines.
8. To decide whether parts shall be manufactured by the shop or purchased outside.

These are the customary duties of the engineering department, and yet they are often prominent by being neglected. I could cite hundreds of instances where attention to these items has made great savings. For instance, in one plant where a plate had originally been made of ¼-in. thick cast iron, the design was changed to copper, but the thickness was not changed. A sheet of ⅛-in. copper would serve the purpose equally well and when the change was made, almost $13,000 was saved annually.

Some manufacturers take a costly pride in "making everything in their own shops." Not once, but frequently I find shops equipped with automatic machines. The small quantities of screw-machine products used require that the set-up be changed at such short intervals that it would be much more economical to buy them outside. Whether to make or to buy can be determined to a fine point by the engineering department working with the purchasing agent and the cost department.

Some Concrete Examples

Thoughtless designers waste much money by specifying a different screw or bolt for many new designs. Admittedly, screws, nuts, bolts and so on cost little. A five dollar bill will buy a lot of them, which undoubtedly was the reason that one shop for which we did work had in one year bought 37,400 screws of 184 varieties; an average of only 203 screws of each variety.

It was amusingly easy to eliminate this. We determined what sizes of screws, bolts, nuts, nails and so on were most generally used, and made those sizes standard. Then, if a draftsman wanted something that was not in stock, he had to prove that nothing else would do.

When we finished, we had reduced the asset "General Stores" from $50,000 to $30,000. So, in this alone, by merely reducing the varieties of sundry supplies, we so reduced the quantity that $20,000 was released from the storeroom.

Here is another "horrible"—but not unusual—"example." This shop carried in stock nine sizes of square brass rods, thirty sizes of round and twelve sizes of hexagonal, besides much larger assortments of brass and german silver, wire and strips, most of which were unnecessary. We checked all of these items against the designs and eliminated the need for 77 per cent of them. Four of the parts alone showed this condition:

Part No.	Name of Part	Material	Stock Used	Stock Recommended
322A	Binding post screw	Brass	$\frac{11}{16}$ in. sq.	$\frac{5}{8}$ in. sq.
17B	Special nut	Brass	$\frac{5}{8}$ in. sq.	$\frac{1}{2}$ in. sq.
217A	Binding post screw	Brass	$\frac{1}{2}$ in. sq.	$\frac{3}{8}$ in. sq.
912A	Binding post screw	Brass	$\frac{1}{2}$ in. sq.	$\frac{3}{8}$ in. sq.

$\frac{11}{16}$ in. stock used in no other part than 322A.
$\frac{5}{8}$ in. stock used in no other part than 17B.
$\frac{1}{2}$ in. stock used in no other part than 217A and 912A.

Note that in three of the four cases the size of the material used was reduced. The amount of money tied up in stock was not only reduced, but a saving of a few thousand dollars a year was made due to reduced material consumption.

Very similar to this saving is the one that can be made by making the same part do for several assemblies. Too often the only difference between some of the parts common to two or more assemblies is a slight difference in a dimension which might well be the same. One shop which turns out a single type of product, to the customer's specification, formerly made every part to order. A study by the engineering department showed that more than half of the parts might well be standard. These parts are now manufactured to stock, and only a few go on special shop orders. This enables what is practically a job shop to plan a good share of its production with the ensuing economies. Some of these savings may seem small, but in the aggregate they are well worth while in most any shop. Just recently I saw an instance where nearly a hundred thousand dollars worth of new machine tools had been bought by the shop without consulting the engineering department. It was found out too late that changes in design of the product were under way which would make these tools useless in that plant. Stupidity? Not at all. That shop is unusually well run, but there was not quite close enough contact between the shop and the engineering department. Point No. 7 had been neglected. It is blunders like these which make me sure that even the obvious things may well be mentioned now and then. In all of the activities I have mentioned it is essential that the engineering department work closely with the shop and purchasing authorities. Sometimes informal contact when specific points come up will do, but this method offers chances for consultation to be overlooked.

Regular meetings of representatives from each of these departments often work well and tend to systematize the contact. When the practical obstacles which face the shop and the purchasing agent are known to the engineer, he can usually work out a design which will be a successful compromise between the ideas of the customer, the condition of the market and the limitations of manufacturing.

Frequently the shop will find it expedient to change a design slightly to fit its equipment, although with proper contact the engineering department should have foreseen this need. But if such a change must be made, the shop must notify the engineering department so that the drawings and perhaps the patterns may be changed and the obsolete ones destroyed.

A hydro-electric plant was partly shut down for several days because this had not been done in the shop which supplied its waterwheels. Here, the shop had seen fit to make a slight change which resulted in lengthening a certain part. When in operation this part failed, the hydro-electric concern wired the shop for a duplicate. The drawings had not been changed and a new part—inches too short—was made up by the shop.

Changes Should Be Reported Promptly

Unless changes are promptly reported, obsolete parts may continue to be made. This was true to a discouraging degree in one plant I know of. Here is an instance typical of dozens which turned up there.

It had seemed desirable to change the location of bolthole drillings in a cast-iron door frame. When we went over the stock we found that there were two different frames in stock, each bearing the same part number. To the casual observer, it would have seemed that the stock of this part was 348. As a matter of

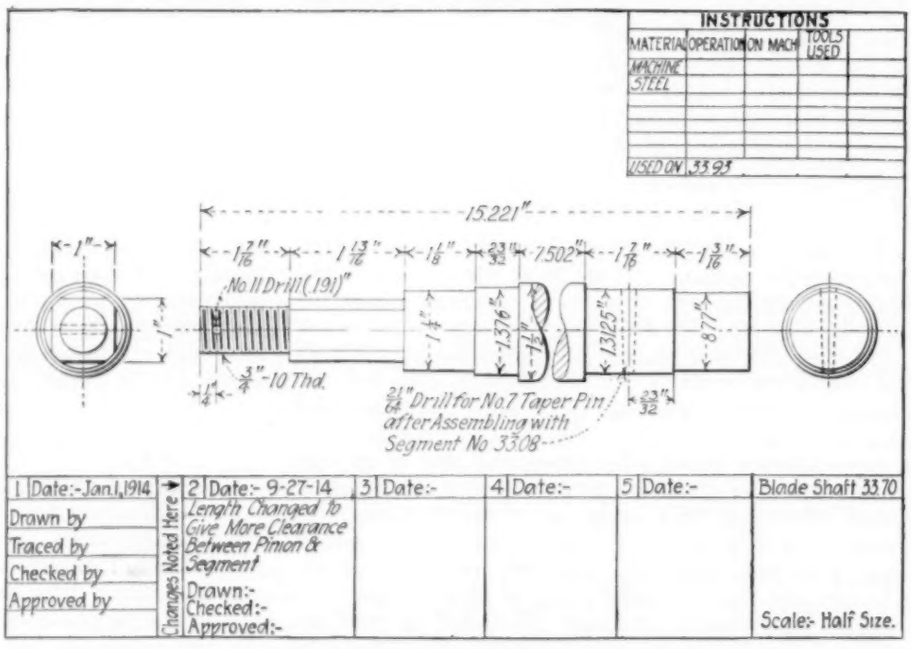


FIG. 14. DETAIL DRAWING WITH PROVISION FOR NOTING CHANGES

fact, 186 were obsolete, having been made up from the old drawings which had not been changed until months after the design had actually been changed. Not only were there 186 useless castings tying up money and taking up room, but time and again production which had been planned on the basis of the quantity shown in stock, had been delayed until a sufficient quantity of the new design could be made up.

A good form of detail drawing, with proper places to show changes, is shown in Fig. 14. For convenient handling and filing it is well to make drawings 8½ x 11 in., or in multiples of that size, the larger ones being folded to the 8½- x 11-in. size. This permits all drawings to be filed in ordinary vertical letter files, is a good size for mailing and is an economical cutting size both for drawing paper and tracing cloth.

It is customary to file blueprints in sets, all of the details of an assembly together. This is good practice, but sometimes it is well also to have a file in which all drawings of similar parts such as faucets, swivels, bolts, connecting rods, etc., will be together. This is for general reference and prevents designing a new part when an old one, or at least the patterns, tools and fixtures for making it, are already available. Before commencing to design, the engineer can review this file.

So much for the design side of engineering.

Duties of Engineering Department

When we come to the "smoothing out" phase of engineering, which prepares an order for the shop we find that the engineering department should:

1. Assign part numbers to each part.
2. Furnish lists of all parts which make up an assembly.
3. Provide detail drawings of each part.
4. List the operations and their sequence.
5. Specify the jigs, tools and fixtures needed for each operation.
6. Provide tooling instructions.
7. Provide instructions as to speeds and feeds.

With these points settled for each assembly, the planning department can go ahead and plan intelligently.

It might seem that assigning part numbers is a strictly clerical job, but actually it can only be done to best advantage by someone thoroughly acquainted with the product. If a part used in several assemblies is given a separate part number for each assembly, almost invariably several of the same part will be carried—one supply for each number. Changes, too, are apt to be made which will often require a change in part number and the engineering department is the one to know first of these changes.

Whether or not the production in a shop is closely planned, the first step when an order is received is to get from the engineering department a complete bill of material or list of the parts comprising the assembly. How often have we seen machines cluttering up the assembly floor waiting for a single part which someone forgot to order into the shop weeks before? Leaving it to a foreman to take off a list of material from a blue-print is a risky method of assuming that everything needed for an assembly will be made. Waiting for an assembly-floor shortage report to start production is an expensive procedure.

The parts list shown in Fig. 15 is used by the Warner Gear Co. which has a highly-planned shop, making automobile transmissions, gears, differentials and so forth, in large quantities to order.

This bill of material which is filled in by the engineering department for each new order shows the part number, part name, whether the part in question is to be purchased or manufactured, the number required per assembly, the kind of material, the symbol for the material and the dimensions of the rough stock. The four blank columns on the extreme right hand side of the bill, are blacked in so as to show up white when blueprinted.

The Columns Serve Various Purposes

These columns serve various purposes. The production department notes in them from the stock record the number of pieces required for the order, the number of pieces on hand, and the number of pieces necessary to be purchased. They are used by the cost department for figuring the final cost of the assembly; that is, by assigning to one column, each of the following items: material, labor and the expense against each part.

On the copy of the parts list which goes to the tool-designing department—a section of the engineering department—are noted any parts which are new or which require different machining from previous parts. This aids the tool-designing department to determine what new tools are necessary.

After going over the parts list and routings for the new parts, the tool-designing department lists up all new tools required with the part and operation number on which they are required. One copy of this list is sent to the production department, in order that the date each tool is required may be known. This list after being dated is sent back to the tool-designing department to determine the sequence in which the tools must be finished.

The parts list is really the starting point for planning throughout the shop. We will see in detail how it is used in later articles.

I speak frequently of a "well-planned shop." I want to repeat that by that I do not necessarily mean "completely planned" or "rigidly planned." Some shops can be completely planned; few can safely be rigidly planned. The well-planned shop is the one which plans every operation which can economically be planned. In many shops of the job type, the planning will be confined to smoothing the way for the order and most of the plan-

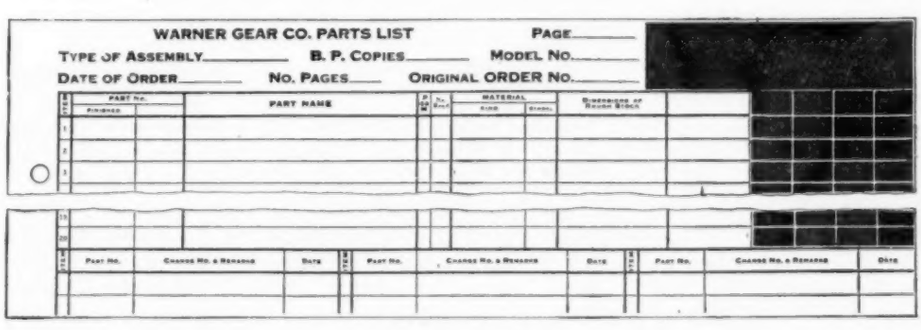


FIG. 15. A CONVENIENT FORM OF PARTS LIST

ning will be the preliminary preparation by the engineering department.

It is evident from a glance at the duties we have already listed as having a bearing on planning, that many of the preliminary activities of the engineering department are based on time studies. Both the planning department and the engineering department use the records of the time-study men, and it has always seemed to me that logically this activity should come under the engineering. It is not, however, a matter of vital importance who the time-study men report to, provided the engineering department is able to get quickly the accurate time studies that it needs.

The instructions to workmen on speeds and feeds are of course based on time studies. Where a large number of a part is to be made, it is well to take time studies, from which the best tooling instructions can be drawn up, and which will serve as a guide in designing the best jigs and fixtures.

Tools Designated on Drawings

It is not enough merely to have the proper tools, jigs and fixtures on hand. The engineering department must put in writing the ones to be used on each part. I have seen foremen and toolroom employes wasting hours at a time in a blind search for the right tools after the job is at the machine, and failing to find it, hold up work while one is made, while likely as not the ones they wanted were around somewhere.

If on the drawing, or on some instruction card numbered to correspond with the part, the tools, jigs and fixtures are listed, there can be no chance of such delays as this. I strongly recommend that the same number be given to the part, the drawing, the patterns and core boxes, the tools and fixtures. This will avoid much confusion and the delay that always accompanies confusion.

In some plants, as I have said, the activities of the engineering department are about all the planning that can be done; in others much more is feasible. In either type of plant, it is up to the engineering department to determine what must be made, the methods to be used and to provide the best tools for doing the work. The manufacturing departments are thus left free to do what they are supposed to do—make the product, and nothing else.

The Function of Clearance

By Francis W. Shaw
Didsbury, Manchester, England

In criticizing Dixie's bushing suggestion Clarence E. Silver, on page 795 of the *American Machinist* states that he does not see how the loose bushing is going to be a success for the reason (among others) that the two fits would double the clearance, making this 0.012 in. instead of 0.006 in., and that would mean more lost motion; which prompts me to ask why so much clearance?

What really is the function of clearance? Is clearance necessary merely for the purpose of lubrication? If so, why should it greatly exceed the thickness of an oil film, And how thick or thin is that? The gentleman who set out to measure the thickness of an oil film by a taper ring fitting a taper bar, found that after he had applied the oil to the surfaces the ring went farther on the bar than it did before—suggesting to him that an oil film has negative thickness.

Now I would suggest that the real office of clearance is to allow for errors in alignment and for temperature expansions. Disalignment is caused mainly by errors in workmanship. If the bushing was badly made, the outside being eccentric with the inside, the clearance allowance would necessarily be larger than where the hole and outer surface were truly concentric unless, of course, the eccentricity was in the same direction at both ends, in which case the clearance could still be small. But bushings are not likely to pass the inspector if appreciably eccentric, so we may neglect eccentricity here. All the additional clearance necessary would then be that sufficient for two oil films instead of one. I do not think that the clearance should be doubled as Mr. Silver suggests; another 0.001 in. would be ample.

A System of Limits

It seems to me that the nominal clearance can always be less where parts are made to a system of limits. Then, if work is done within the limits, the actual clearance will always be a little greater than the nominal; that is to say, it will be greater than the so-called allowance. Where the workmen are left to themselves the likelihood is that holes will be on the low side of the dimension aimed at, while the shafts will be on the high side. If so, then the allowance will always be less than the assumed allowance. For intsance—the aimed-at dimensions of a shaft and hole may be 1.000 in. and 1.006 in. respectively to give an assumed clearance of 0.006 in. To avoid the possibility of scrapping the job the workmen will tend to make the shaft a little oversize and the hole a little undersize, with the consequence that if he takes a liberty of only 0.001 in. in each case the actual clearance will be 0.004 in. instead of 0.006 inch.

When I see tables of working limits on which the allowances are very large for so-called low qualities of work, these tables always appeal to me as having been based on old practice where the clearances, as explained, always tend to become less than that assumed. Large *tolerances* are, of course, quite in order, for they permit the employment of reduced skill and equipment of less accuracy than is called for in a finer quality of work, but these large tolerances do not imply that the clearances need be much greater. They must be a little greater of course for alignments will be poorer. Naturally there are exceptions to any rule laid down. Agricultural machinery or machinery that will get careless handling and little or no attention must have large running clearances, but the tolerances need not on that account be any larger than in other work of similar quality. In these cases it is the allowance that counts, for one must not only allow for disalignment of parts as they are originally assembled but for possible greater disalignment by the stresses of heavy usage or of careless reassembling after a dismantling. Rust may also play an important rôle in the regulation of the allowance.

Textile machinery may also be instanced as a case for large tolerances.

Fragile parts when bolted to a wood floor by careless erectors are liable to spring and throw the bearings out of line. In some machines the vibration results in such a displacement of parts that journals would be jammed in their bearings at intervals during the rotation of the shaft if the clearances were small.

Summing up, it might be said that clearance is rather a function depending on errors in alignment rather than on lubrication necessities.

Basic Policies of the Employees' Magazine

By JOHN T. BARTLETT

While frankness and broad, human Americanism are two of the principal factors that contribute to the success of the employees' magazine, one of the most important fundamentals in determining its policy is the matter of control.

SHALL the employees' magazine be maintained and controlled, frankly, by the employer? Shall it be maintained by the employer, but controlled by the workers? Shall it be strictly an employees' venture, the employer having no financial or other interest in its affairs? Shall it be ostensibly the private enterprise of an active employee, who solicits advertising, thereby apparently making it profitable, but who secretly is subsidized and controlled by the management?

In a Middle West industrial center there is a certain employees' magazine editor who has strong views on this question. Jacob Large (that of course is not his real name) has edited two kinds of employees' magazines. The first was secretly subsidized. He began its publication in a troublous labor period. He was liked by the men. He was keen; he believed he was genuinely working for the men's good; and he saw nothing either unethical or, in the last analysis, ineffective in the fact that the company head secretly O. K.'d his copy and kept the publication alive.

Company Head O. K.'s Copy

The employees believed that there were no strings on Jacob Large except their own. They thought his few advertisements made his journalistic venture profitable. They liked the way he wrote about things. Jacob Large believed he wielded extensive influence.

The second publication he edited, and of which he still is the editor, is frankly controlled by the factory management. It carries no advertising, and there is absolutely no hocus-pocus about it.

The company head O. K's all of Jake's copy. The employees understand that published articles have the company's approval, but Jake says little about this side of the work. As a matter of fact, nobody on the outside knows just who it is that O. K's copy. While the company frankly controls the publication, it's constant idea is to tone down this control. The company head interferes as little as possible with the editor's ideas. He does so less and less, and hopes eventually to leave the entire direction in Jake's hands, except for occasional conferences as with any department head.

Jake Large is a clever, tactful and successful plant publication editor. And he is sincere. Why, then, is he a strong advocate of the secretly subsidized, camouflaged employees' magazine? As Jake views the matter, he believes his attitude as editor of the subsidized plant paper is stronger than was his attitude as the editor of a paper frankly controlled by the company, and as such paid by it.

In any discussion, Jake stands up for the camouflaged plant publication every time.

I have gone into this actual case in detail because the fundamental point involved is one which comes up again and again. In any formulation of policy, it has to be dealt with. There are perfectly serious, wholly sincere people who adhere to Jake's faith in hidden control. It is an age-old fallacy that pose is most effective, whereas all experience proves that the absence of pose is infinitely more so, in the long run. Hidden control became such a nuisance in the newspaper and general publication field that Congress passed legislation compelling periodicals to publish regular statements of ownership.

In the plant publication field, there is already sufficient preliminary experience, as well as realization by employers of the principles involved, to indicate clearly that the typical employees' magazine of the future will be frankly controlled, as it is supported by the company. This sort of actual control enables the management to see that the publication is used most effectively for the mutual benefit of all parties to the industrial relation. Moreover, it keeps to the front continually that extremely important thing, the fact of definite leadership by the industrial head. The employees' magazine properly becomes an instrument in making that leadership of a higher, better kind, and in convincing employees of its sincerity, integrity and mutually beneficial character.

In producing an employees' magazine which is likable, convincing, entertaining, elevating, and which consistently tends to improve morale, it is neither necessary nor desirable to attempt to ignore or disregard the fundamental fact that over the entire organization—including the employees' magazine—there is "the Boss."

Cleverness Need Not Conflict With Honesty

Cleverness in preparing employees' magazine material; tact in handling delicate subjects; effective devices to form a better, saner body of employee sentiment—all these do not conflict with a policy of honesty and frankness, but are helped by it. The employees' magazine is no place for tricks, dodges, or stunts to capture employee confidence. It is no place for camouflage. It is, however, a place demanding keen regard for things of human nature. The editor, and the executive head under whom he works, cannot be too expert in this direction. The employees' magazine has instrinsic truths to sell.

Jake Large stands up for the camouflaged, subsidized plant publication. But here are two significant facts: First, the company which employed Jake, on a secretly subsidized paper, now uses the frank, above-board type of employees' magazine. Second, Jake's present employer is quite satisfied with the results Jake is getting—with the frank, above-board type. The facts are against Jake.

Frankness on the part of both employer and employee as a constant, normal condition, not arrived at in an emergency as the accompaniment of ultimatums, is eminently desirable. Any system of shop representation which produces genuine, constant frankness and tends to fuse viewpoints rather than to keep them divorced, is worthwhile.

At a time when closer, warmer, frank relations between company and men are unusually necessary, the employees' magazine whose policies did not build in this direction would be disregarding an obvious

opportunity. As an aid to any system of shop representation, the employees' magazine helps by regular, lucid reports of committee conferences, discussions, and decisions. The grounds on which a particular decision is made are clearly indicated.

The employees' magazine is going to see that all such matters in joint discussion are clearly explained, and that the management's reasons are expressed in detail. Once the company management has respect, liking, and confidence of employees, its position in any question that comes up is going to be safe.

A belief in frankness, and a faith that no side of the industrial relation is too sacred to touch, is made basic policy in several employees' magazines on my desk. The significant and extremely encouraging thing, I think, is that the companies using these publications, in which the editorial management is tactful, but does not pussyfoot or kotow, are companies in certain instances which, in the way of labor, have had unusual obstacles to contend with during the current period of inflation.

A Western employer who maintains the frank type of employees' magazine recently talked before the metal trades association of his district, by invitation. He discussed freely the position in which his company, the backbone of that particular industry in the district, was left by the falling off of war demand. He told of his plans for the year, which included, contracts lacking, the production of his particular commodity for the open market. He said frankly that competitive conditions were such that further advances in wages could not be granted. The firm would simply have to go out of business, that was all, if a demand was made for them.

Frankness Believed

When a report of his talk was published in the employees' magazine, there wasn't any riot. The men believed him. Local observers don't expect this company to have labor difficulty the current year.

As a result of former constant and serious labor difficulties, including a serious strike and a bad spirit within the plant, this employer "took account of stock." He established a department to deal with industrial relations. While he was at it, I believe, too, he saw weaknesses in himself as an industrial leader, and deliberately set out to be a better employer. He started the employees' magazine, and set up machinery whereby the slightest grievance of employees could be handled before it grew big.

Instead of waiting until trouble came to tell workers the firm's position, he began to keep them posted month to month, through the employees' magazine. His frank statement concerning wages, before the metal trades association, was made when no demand for wage increases was being formulated. He had completely altered his labor situation—for the better—in less than a year.

In Massachusetts is a nationally famous manufacturing company which for many years has been supreme in its specialized field. Its products are a household word all over America. The founder of the business, a grand old New Englander, is now dead, but the ideals he converted into business gold are still the foundations of what is in every sense an institution.

This company makes frankness a basic policy of its employees' magazine. Employees know right along what trade conditions are. They are never given an opportunity to forget the business ideals of quality and thorough honesty on which the business is reared. In connection with subjects discussed between employer and workers in the operation of the shop representation system, there is open, straight-from-the-shoulder reply by the management. There is no hedging, glossing, or side-stepping.

At the end of 1919, this company's employees magazine—over no signature—carried a survey, written in readable language, of the past year—the problems, the unusual trade conditions, the triumphs, the difficulties wholly or only partly met. This was a broad, absolutely frank survey, how frank you may gather from the deliberate admission that quality had fallen off somewhat, incidental to rushed production. Quality is a fundamental idea in this company's plan, as I have suggested, and even in the flurry of abnormal times, the company head doesn't forget it, nor neglect to keep it firmly before the workers. The employees of this company are traditionally zealous for quality, and the management strives to keep them so, through these stressful times.

A Policy of Broad Human Americanism

A policy of frankness finds a logical running mate in a policy of broad, human Americanism. It might be said that either implies the other.

One of the most important employees' magazine undertakings in the country, the *Booster*, published monthly by the American Woolen Co., combines the two.

I imagine there is not another industrial organization in New England employing a greater variety of nationalities than the American Woolen Co. employs at its Lawrence, Mass., mills. And superficially, one would say, there is not another aggregation of employees anywhere more difficult to reach through an employees' magazine. Many of them were born overseas; some cannot read or speak English. Many of them have never been Americanized.

Associated press dispatches in the past have carried Lawrence strike stories all over the United States and Canada. A little while ago the newspapers of two countries began to print something else about Lawrence. They told about things the American Woolen Co. was doing to reduce living costs for its workers.

William N. Wood, president of the American Woolen Co., takes a broad view of the employer-employee relation. He believes that the interest and concern of the employer should extend beyond the day's work of the employee and into his life. In a statement in the *Booster*, one of the things the publication is devoted to is given as the happiness of employees. There is warmth for you! The American Woolen Co. insures workers, helps women employees in motherhood, maintains day nurseries, and does kindred work. The company is establishing a position of sincere, honest, active leadership which means not only a better product and more efficient production conditions, but happier lives for the employees.

I have said that frankness and broad, human Americanism are policies characterizing the *Booster*.

As to frankness, it is manifested in one phase in outspoken editorials on foremost economic questions of the times. The company does not temporize here nor sidestep; it expresses those fundamental economic truths on which the established system of American industry rests, and suggests why they are true. Especially does

it hammer away on that simple truth, the indispensable importance of earnest work and thrift in any scheme of life—anywhere, any time—which aims at satisfaction and happiness for the individual and the nation.

The Story of an Immigrant

A policy of broad, human Americanism, and always the same frankness, is carried into the editorial handling of news matter in the *Booster*. Here, for example, is the story of an immigrant, a faithful employee of the company for many years, who has "got on"; who owns his home and garden patch; who has attained happiness and contentment through conscientious work, thrift, and those unpurchasable things of home and family life. He likes America, believes in it. There is nothing sensational, there are no highlights, in a narrow journalistic sense, to a human story like this, but it is the story of contentment as millions of Americans have found it, and as anybody can who will. The *Booster* characteristically handles a story like this with frank approval of the subject, genuine warmth, even to the big family of boys and what the father means to do for them in the way of education.

Equality of opportunity is not theory, but fact, in America. The body of American thought appreciates the importance of those individual things of character which make for success and for happiness. A clean-cut fairness, a faith in America and Americans, a confidence in the power of the individual—these are American characteristics. They are characteristics which agitators and radicals have attacked and attempted to break down. They are characteristics which many foreigners in this country have not made their own.

The policy of every employees' magazine ought to be to adhere to a broad, human American viewpoint in handling material. It ought to sell the American philosophy of life to such American citizens as are half-hearted in it, and it ought to sell the American view of things to foreigners.

Americanization

The American Woolen Co. employs many foreigners, and Americanization is vital in its work to better conditions. One of the things it is doing in its employees' magazine is to publish, issue to issue, lessons in English. Another thing is the publication of the Constitution of the United States, serially, clarified and made understandable for newcomers to this republic. Cornelius A. Wood is the author of this, assisted with suggestions and in reviewing proof by Prof. Arthur N. Holcombe of Harvard.

Editorials on George Washington, Lincoln; quotations from patriotic utterances of Roosevelt and other great Americans—all are used, issue to issue, in sizeable volume. The *Booster* is permeated by the patriotic spirit, fairly soaked in it.

The reader is given no opportunity to forget that the company, as well as the workers, is a party to the publication, but the effectiveness of the magazine is not thereby diminished.

There was a period in the history of journalism, now much lamented, of which it is said, "An editor then actually exerted influence. He molded public opinion. He made and unmade political champions. He led public thought."

Horace Greeley is often paid tribute in this connection.

The employees' magazines of the United States and Canada have an opportunity at this time to wield an influence, in shaping employee opinion reaching millions, much more important and beneficial than the old-time American editors ever wielded. They have an opportunity to help their industrial organizations, through a clarification of thought and an intensification of endeavor, to increased working efficiency and mutual benefit. They have an opportunity to contribute vastly to the public good.

In order to do this, however, employers and editors must regard their magazine as a publication which is actively to shape thought. It is to shape thought in competition with the agitators and the radicals, the irresponsibles and the Reds. There are all the elements of an actual contest. The stake is the plastic thought of millions of employees. It is one head against another, the brains of the executive who has won out by sheer force of character and training, who is able to combine vision with judgment and pierce through to the inner truth, pitted against the brains of the labor agitator with half-baked theories, often downright untruths, but possessing perfected cleverness of appeal and shrewd knowledge of human nature.

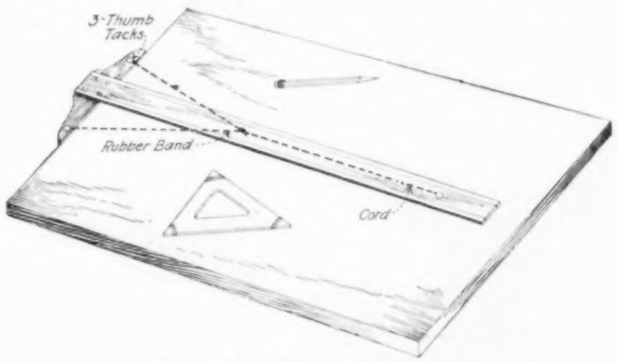
Which man is better fitted to mold employee opinion? Which man ought to, for the public good? Which man has on his side the advantage of intrinsic truth?

There would be no contest at all were it not for two things; first, that industrial management is sometimes not high-type, and second that the labor agitator is a human nature expert. The employer must first make sure that his position is absolutely sound, in respect to a genuine regard for the employees' welfare and thorough square dealing, and then turn human nature expert, too. He must dig down to fundamentals, get his bearings, and then fight it out on that line all summer. This is where the employees' magazine, and the skilled editor, fit in.

Some Drafting-Room Kinks

By Henry H. Moore

The common rubber band is a very handy and useful little accessory to the draftsman. A small band wound around pencils, penholders, etc., will keep them from rolling off the board, and saves many a broken point.



KINKS FOR THE DRAFTSMAN

Three such bands wound around the corners of a triangle, notches having been cut in the wood to hold them from slipping, raise the triangle above the surface of a tracing and reduce the danger of smudging.

A larger band, or two, and a piece of cord serves to hold the head of the T-square always in contact with the edge of the drawing board, the device being attached to the under side of the square and board by tacks.

Unusual Methods of Securing Extreme Accuracy—IV

By A. L. DE LEEUW, M. E.
Consulting Engineer

The concluding installment describes the most important and difficult operation on the cradle forging, the lapping to finish size. The article ends with a brief account of the high-pressure hydraulic test to which each finished part is subjected.

(Part III appeared in our May 13 issue.)

THE real trouble began at operation 42 which was the lapping of the small cylinder. Two thousandths of an inch had been allowed for this lapping and proved to be sufficient to remove the tool marks of the finish-reaming. It was originally thought that it would not be possible to do this lapping entirely in a mechanical way and that a considerable time would be required to instruct and train men in the art of lapping. However, it was not thought practical to attempt to train men to a point where, by the mere skill of hands and eye, they would be able to produce both the extreme accuracy required and the beautiful finish which was said to be necessary.

The following method was adopted and proved to be entirely satisfactory for producing holes of the proper finish and of much higher accuracy than required in the specifications. It is believed that the success with the recoil mechanism as manufactured by the Singer Manufacturing Co. was largely, if not entirely, due to this method of lapping.

The lapping was divided into two processes, lapping and polishing. The lapping was for the purpose of producing a hole of proper size and roundness, the polishing for the producing of the mirror-like finish. The amount of metal removed in the operation of polishing was not measurable and was probably more in the nature of a burnishing operation without much abrasive action.

Two styles of machines were used for these operations, though the style which was used for the lapping would have been suitable also for polishing. However, the fact that some machines of the second style were immediately available, and that the first style was not absolutely required for polishing, was the deciding factor in making this division. The main difference between the two machines consisted in the fact that the piece to be lapped was held in the first style of machine in an indexing fixture, and in the second style of machine was held stationary. The first style machine is shown in Fig. 54 which shows the entire machine, and in Fig. 55 which shows the feed mechanism and the holding fixture. The feed mechanism was disconnected for short-stroke lapping.

The machine consisted of a bed *A* on which was mounted the fixture *B*, in which the holding fixture *C* could revolve on trunnions *D*. At the outer end of the machine a motor *E* was mounted. This was a variable-speed motor of 10 hp. capacity, running from 600 to 1,800 r.p.m. but of which only the lower speed was used. The motor was reversing and the reversing mechanism *F* operated by the dogs *H* and the tappet *G*, Fig. 54, would reverse the motor in a small fraction of a second, so that it was even possible to use the machine on strokes as short as 18 in. This was an extremely exacting duty of motor and controlling mechanism, but this part of the apparatus, furnished by the General Electric Co., stood up well and did not give any serious trouble. The motor shaft was directly connected to a screw *I* which had 3½-in. lead, double thread, and would give a lapping speed

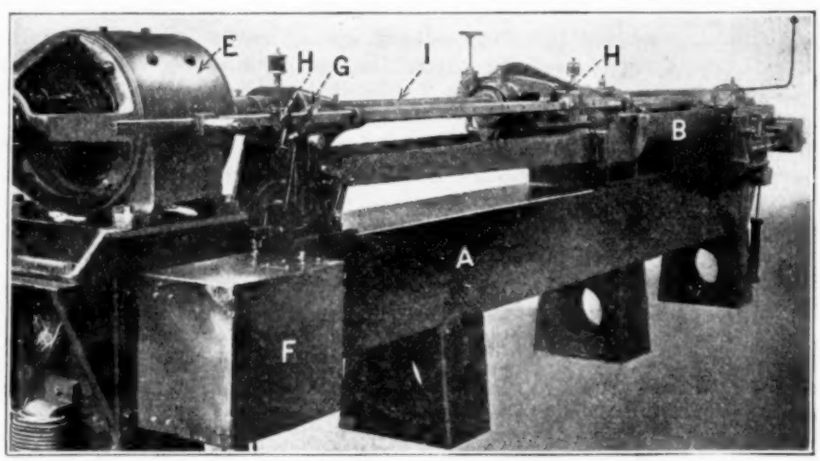


FIG. 55. DETAILS OF FEED MECHANISM

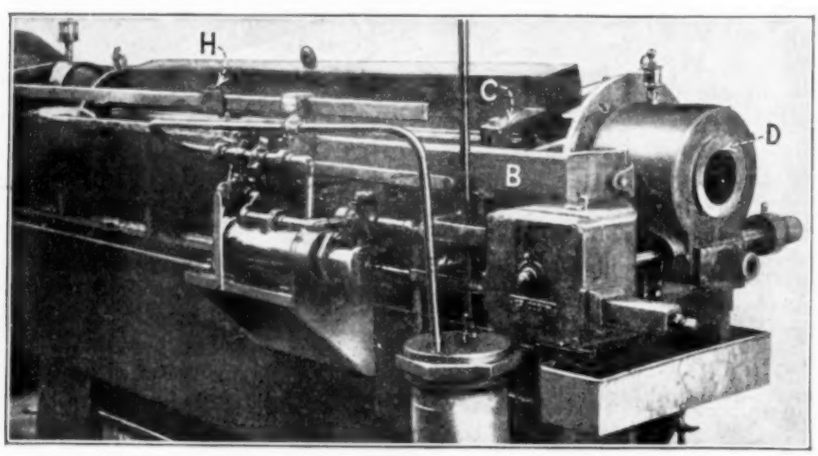


FIG. 54. THE MACHINE FOR LAPPING HOLES

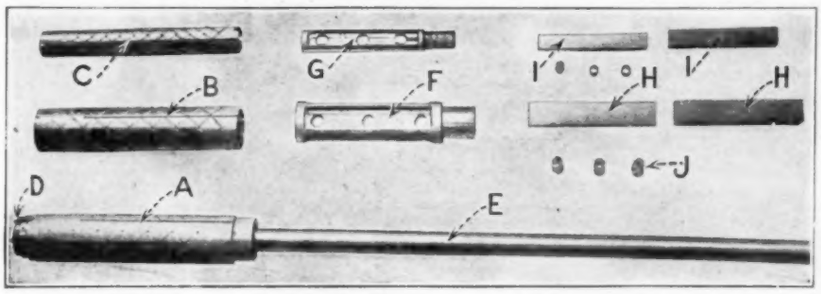


FIG. 56. THE KIND OF LAPS USED

of 175 ft. per minute. The lapping was not done, as is usually the case, by rotating but by reciprocating the lap in such a way that about half the length of the lap would project beyond the end of the piece at the end of each stroke. After each stroke the piece would be rotated through a small angle, the rotating mechanism being shown in Fig. 55.

An Interesting Feed Mechanism

The feed was pneumatic, a feed dog tripping the inlet valve so that the air can push the piston and rack to the right. At the extreme right the piston closes the inlet and opens the exhaust. A constant air pressure on the right side of the piston returns it to its position at the left, but before the end of the stroke the rack closes the exhaust valve to form a cushion. The movement is transmitted through a one-way ratchet and wormwheel with gears, with teeth so calculated as to avoid uniform positioning of the work at each stroke.

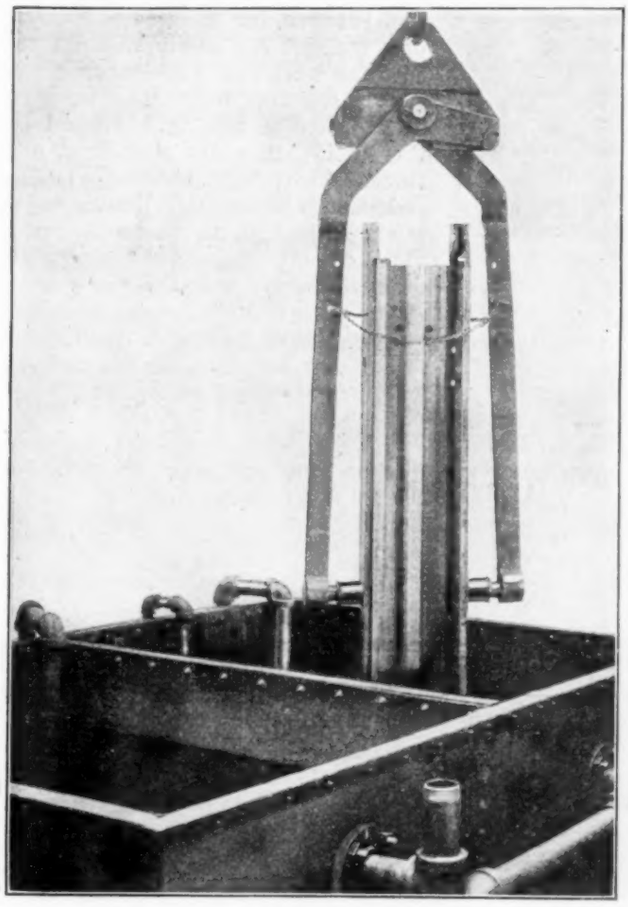


FIG. 57. WASHING HOLES AFTER LAPPING

Fig. 56 shows the tools used for the lapping operation. *A* is the shell of the lapping head quite worn out; *B* and *C* are new shells for the large and small holes respectively. *A* is mounted on a head with taper wedges for expanding the shell by means of the nut *D*; *E* is the hollow bar to which the head is attached.

The lapping compound consisting of No. 4 F carborundum and vaseline was forced through the hollow bar by means of a little force pump. It was squeezed through the small holes visible in the shell and carried by the right- and left-hand spiral grooves of the shell to the work. As the piece and not the bar revolved, or rather indexed, every part of the hole was subjected to exactly the same action. The result was that the hole became round. The fact that all of the outside surface of the shell carried lapping compound made the action relatively easy.

After lapping, the cradle was washed in soda and hot water as shown in Fig. 57. It was then put on the second type of machine as shown in Fig. 58. In this machine the piece was held stationary, and the lapping bar reciprocated and was also indexed. The reciprocating motion was obtained by a planing-machine drive and the feed by means of ratchet pawl and dogs. In this machine the same style of lapping bar was used but with an entirely different lapping head. In this case the lapping head was made of aluminum and of the shape as shown in *F* and *G* respectively in Fig. 56. The stones *H* and *I* were placed in the recesses of the aluminum head, spread apart by the springs *J* and kept in position by a piece of twine before they were inserted in the hole. The stones used were made of the so-called "water-of-Ayre" stone. This stone is exceedingly soft and being absolutely free from grit, does not produce any scratching. Great care had to be taken, however, to wash all of the abrasive material out of the hole before going over to the polishing operation; a grain of carborundum left from the lapping might imbed itself

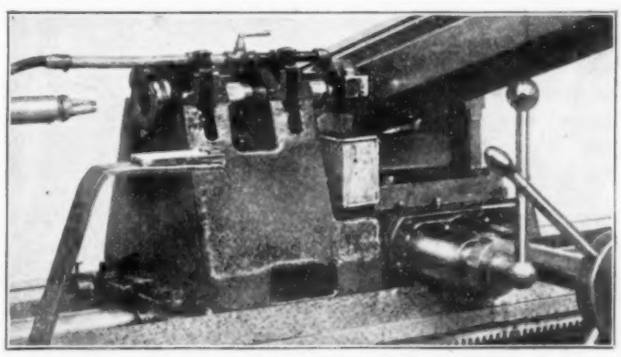


FIG. 59. REAMING THE TRUNNION

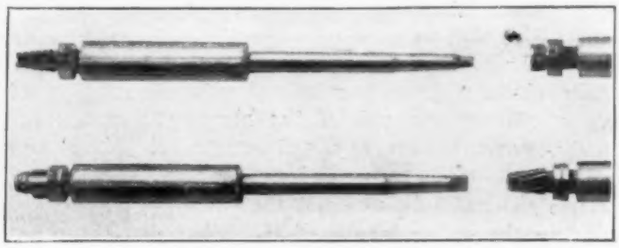


FIG. 60. TOOLS FOR REAMING TRUNNION

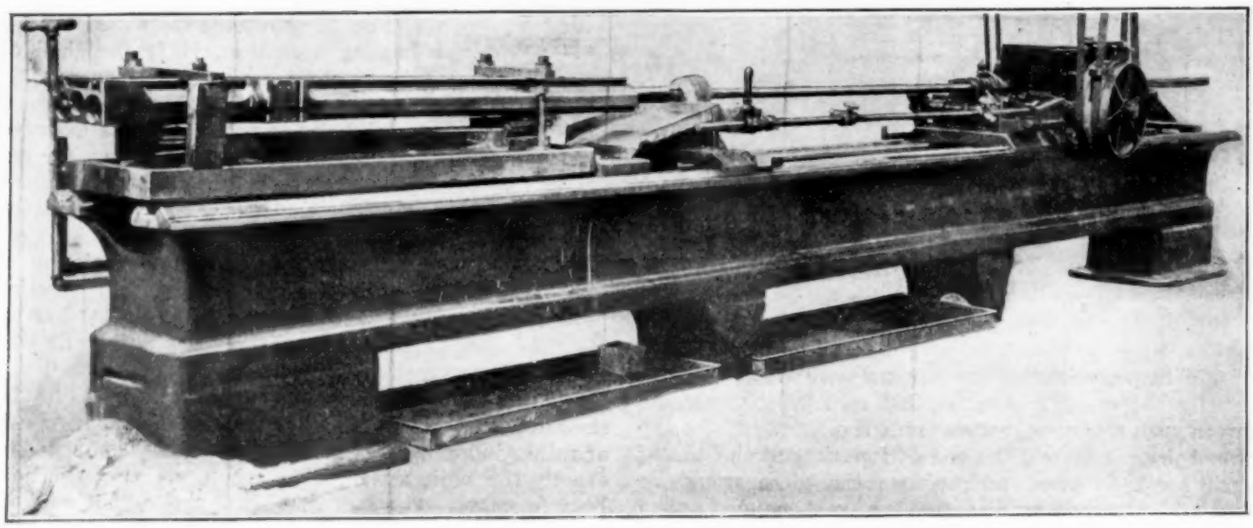


FIG. 58. MACHINE FOR POLISHING THE HOLES

in the water-of-Ayre stone and scratch the surface. The reason why it was not so important to have the work indexed during the polishing lies in the fact that this polishing did not remove a measurable amount of metal.

In the original method of lapping, but which was not followed by the Singer company, a lapping head was used similar to the one used for polishing. Carborundum stones were used as abrasive material with thin oil as lubricant and the lapping bar was indexed while the work was held stationary. This was satisfactory so long as the two stones were in a vertical position, but when the stones were horizontal the weight of the head and bar would cause the stones to rub in the hole with a wedging action and gradually cause the center of the hole to drop. In other words they had a tendency to produce an oval instead of a round hole. In the machine which was originally designed for this purpose, the lapping bar was supported close to the work. This in the opinion of the writer may be classed among many other good intentions, and led in the same direction as good intentions are generally said to lead. This support caused the lapping bar to overhang very little at one end of the stroke and very much more at the other end, so that the tendency to wedge, and to cause an oval hole, was not the same during the entire length of the hole. The result was that the hole was not only out of round, but that it did not have the same section throughout.

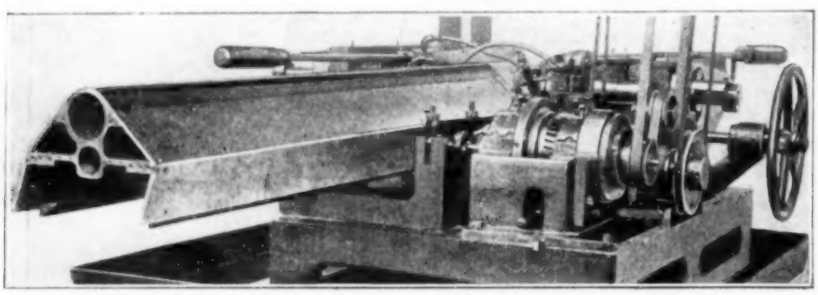


FIG. 61. MILLING TRUNNION THREAD AND DRILLING

The pieces which have to move into these holes have to be packed with extreme care and this packing must conform to the section of the hole. If the hole was oval but of uniform section, the packing might adjust itself gradually to this oval form and thereafter work satisfactorily. But if the hole is of non-uniform section, then the packing must assume a different shape every time it moves along the inside of the hole, and this would certainly lead to failure in the function of the mechanism. It was for this reason that it was thought absolutely essential to have the work rotate and to have the bar entirely free and without support. In addition to turning trunnions on the outside, they are also bored and threaded with the aid of special attachments and devices. One of these is shown in Fig. 59, where the trunnion is being reamed with the taper reamer shown. The fixture for holding the work by the outside of the trunnion is plainly showr, as well as the long bushing which guides reamer into its correct position. Fig. 60 shows the taper reamers, as well as the tools for counterboring for the thread.

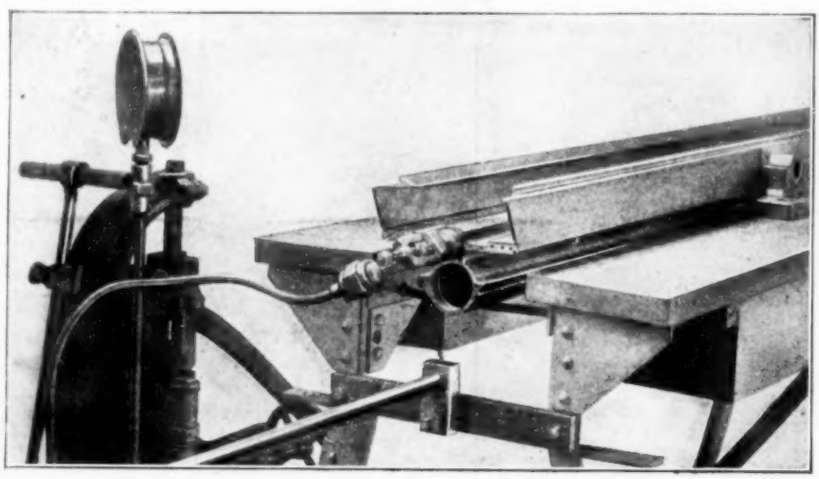


FIG. 62. TESTING THE FORGINGS AT HIGH PRESSURE

In Fig. 61 is another special machine built to mill the threads in the end of the trunnion, and also to line-ream the brackets which carry the sighting mechanism after it has been assembled in place. The thread-milling is done by the nearest spindle, while the one in the background reams the two holes to insure their correct alignment. After the cradle is completed, the holes, which are threaded at the ends, as shown in Fig. 62, must be plugged and tested to be sure the steel is of the proper strength. The kind of connection used is shown in Fig. 62, where the small hole is being tested. This is tested to a pressure of 5,100 lb. per square inch.

Graduating Range Finder Sights

By I. B. Rich

The range-finding device used in naval anti-aircraft gun sights contains a sheet-metal drum shown at *A* in the three illustrations. This is of fairly large diameter with the edge turned over to receive the graduations, as can be seen. In order that these graduations may be plainly visible both day and night, the numbers are drilled through the rim and a small lamp on the inside makes them easy to read after dark. The method of drilling these holes involves the use of a high-speed sensitive drilling machine and the graduating device shown. The drum *A*, Figs. 1 and 2, is mounted on the other end of the spindle which carries the index plate *B*. This index plate, in connection with the stop *C*, locates the drum in its various positions, ready to have the proper numbers drilled through the periphery.

In order to drill the holes forming the desired numbers, it is necessary to move the work under the drill so as to bring it in the proper position for the hole. The positioning is controlled by the master plate *D*, this being held in the slide *E* and positioned by the stop *F*, which brings the individual number to be drilled in the proper position.

The work and indexing wheel are carried on the floating table *G*, which is free to move in either direction by means of the universal guide *H*. The rod *I* is connected to the floating table by means of the ball joint *J*, and is held between the two uprights by the universal joint *K*. By this means any movement of the upper end of *I*, no matter what its direction, is transmitted to the floating table and to the work, moving it to any desired position under the drill.

The guide *L* is knurled on the outside and forced down by a light spring. The point of *L* fits into any of the holes of the master guide plate *D* and holds the work in a corresponding position while the hole is being drilled. In Fig. 3 the first hole is being drilled in number 7. After this hole is drilled the operator will raise the index pin *L*, move it to the next hole in plate *D*, and in so doing, will move the whole mechanism in one point toward the drilling-machine column. After the third hole is drilled the operator will start to drill

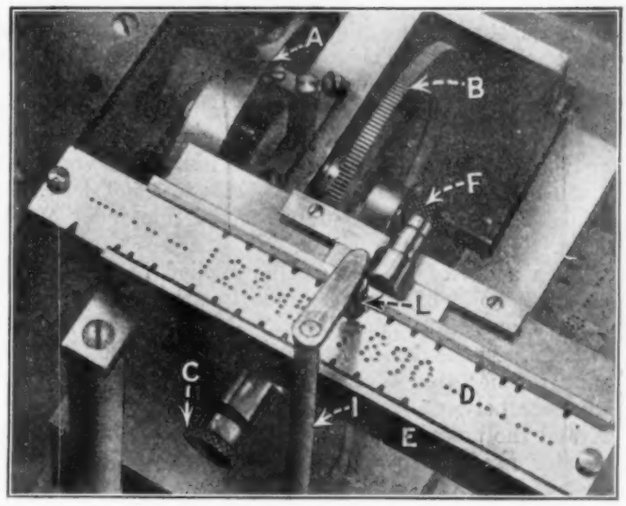


FIG. 3. VIEW FROM TOP, WITH GUIDE PLATE IN POSITION

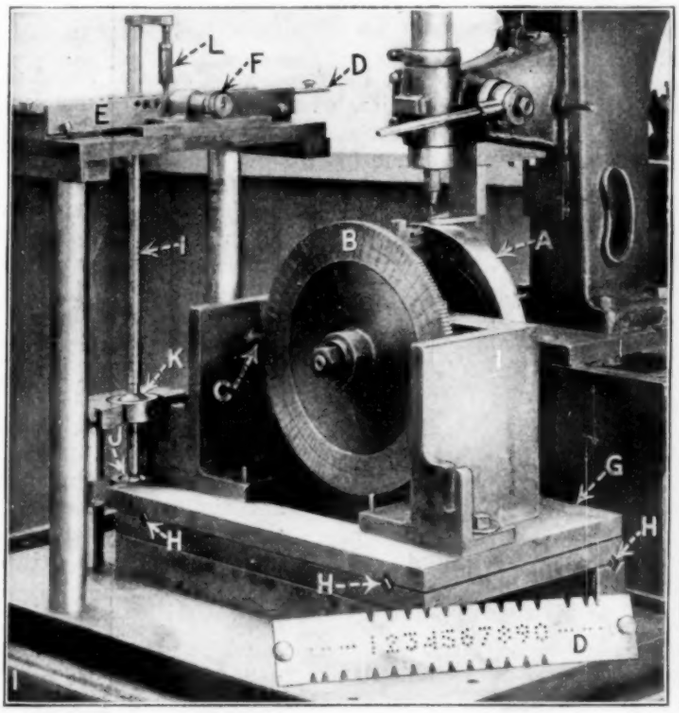


FIG. 1. DEVICE FOR GRADUATING RANGE-FINDING DRUM

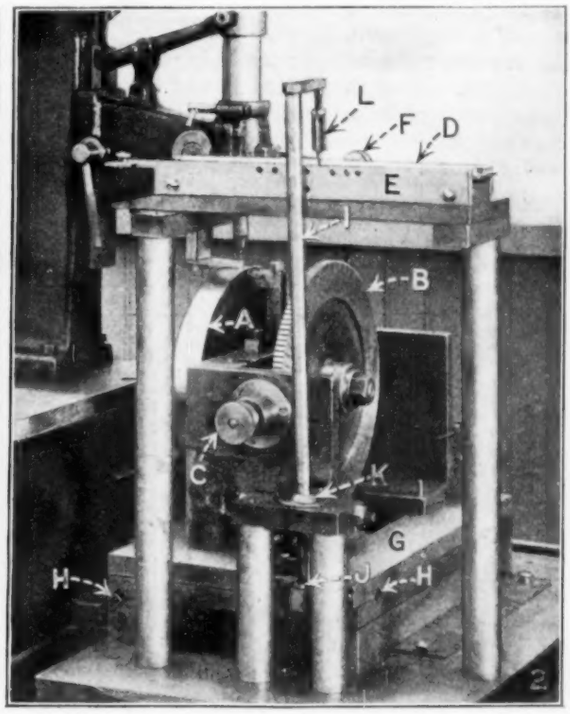


FIG. 2. BACK VIEW, SHOWING MULTIPLYING LEVER

down the stem of the number, which will move the whole work-holding device sideways and, at the same time, a little away from the drilling-machine column.

By moving the master guide plate *D* to its proper position it is possible to drill any sequence of numbers on the rim of the drum. These numbers vary from 1,000 to 8,200, jumping by hundreds to 3,500, by fifties to 6,500, and by twenty-fives for the remainder of the scale.

Such a device as this can be applied to the drilling of small holes of various kinds in any sort of design desired, and affords a rapid way of securing any desired pattern. In the device shown the multiplication is about four to one; this of course depending on the relative distance between *K* and *J*, Figs. 1 and 2, and between *K* and the point where the index pin on *L* fits into the master guide plate. This device was designed, built, and used by the Russell Motor Car Co., of Buffalo, N. Y.

Safety First in Handling Gasoline

BY I. E. PEARCE

Do you use a belt-driven pump of any kind in your plant for pumping gasoline, naptha, or any other highly inflammable liquid? If so, it would be well to make sure that the pump and belt are well grounded.

Two serious accidents recently occurred which were the result of pure carelessness. A certain manufacturing establishment used a large quantity of benzine for cleaning purposes, which was stored in underground tanks. The benzine was pumped by a belt-driven pump installation, as shown in Fig. 1. The belt had just been repaired by a millwright, who neglected to replace the ground which was made from thin sheet copper and connected to an earth ground by a wire. As any one knows, a moving belt generates no small amount of static electricity and, in this case, a stray spark caused a serious explosion which wrecked the building and injured several employees. The illustration shows a safe arrangement.

The other accident, in another plant, was caused by pouring gasoline through a funnel in which a chamois skin was used as a strainer. The gasoline was being pumped from a portable tank, Fig. 2, and when the metal nozzle touched the funnel, which was highly charged with frictional electricity caused by the gasoline passing through the chamois skin, the result was a serious fire, a score or more workers idle, and one man blinded for life. A wire "Y" connected as shown

FIG. 2. HOW TO PREVENT AN EXPLOSION BY GROUNDING THE FUNNEL AND NOZZLE

to the funnel and nozzle, and grounded to a convenient water, steam or gas pipe or an electrical conduit would have avoided this accident.

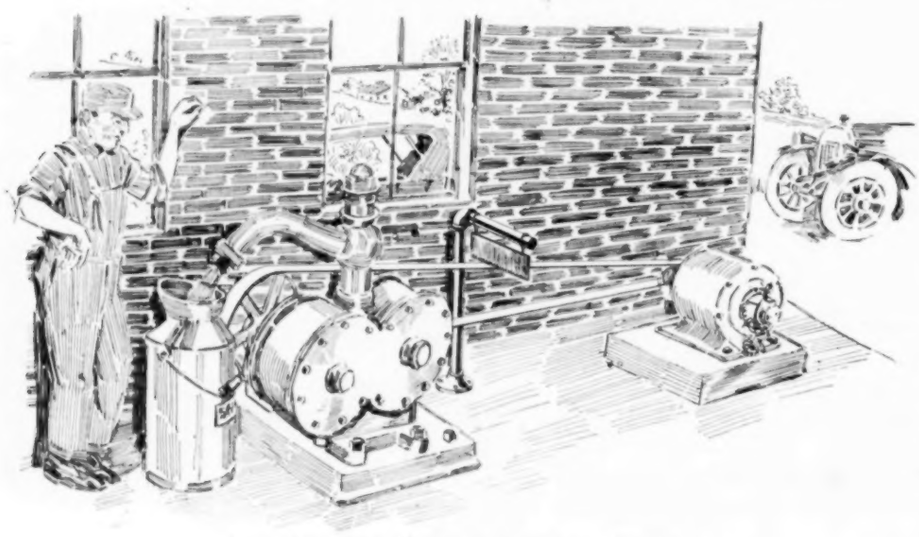


FIG. 1. A GROUNDED PUMP INSTALLATION

A Handy Die Stock

BY RICHARD F. WARD

A handy die stock for use by electrical and other repairmen who have to do with small screws in restricted spaces is shown in the cut.

The body of the tool is made from a piece of cold-

ELECTRICAL REPAIRMAN'S DIE STOCK

rolled steel to take the commercial sizes of round dies. The shank is a piece of ⅜-in. gas pipe of any length desired, with a turned wood handle at the end. A pin through the ferrule fastens the handle to the pipe, the pin being offset so as not to obstruct the central hole, which is carried through the handle.

The object of the central hole being clear through is to allow the threading of long wires held in the chuck of a speed lathe.

The particular field of usefulness for this tool is the re-threading of binding post and similar screws on electrical machinery and appurtenances when the thread has become jammed. Because of the close quarters in which such screws are usually located, an ordinary die stock would be inconvenient, to say the least.

Machining Molds and Cores for Auto Tires

By W. O. FRANCIS

THE modern tire mold consists of three principal parts; the two halves of the mold and the core, as shown in Fig. 1 and in greater detail in Fig. 2. The core is usually made in three sections (particularly so in the larger sizes of tires) to facilitate its removal from the tire after vulcanizing. To hold these sections together while the canvas layers are being placed and all of the building-up work is being done on the tire, steel rings *B*, Fig. 2, are fitted into tapered grooves in each side and drawn together tightly by a series of bolts *C*, thus clamping the portions of the core together.

In the automobile-tire industry the machining of the molds and cores, which are used during the building-up and vulcanizing processes, has assumed large proportions, and many tire factories, have large departments engaged in this work. Outside jobbing shops are also doing considerable of the work for the tire makers.

During the operations on the tire, the core is held on a spider chuck, *A*, Fig. 1, which has expanding arms with sharp V-shaped ends that are forced into the grooves *B* in the inside rim of the core. The spider is mounted on a shaft, supported by a bracket from the floor, and the entire core and tire may be turned freely by the workman while building-up the tire. However, as these V-shaped ends on the arms cause considerable wear in the grooves, it is the custom of some makers to line the inside of non-collapsible cores with a steel ring *C*, which has better wearing qualities than the cast iron and also may be renewed. The two halves of the mold are not actually applied to the tire while the core is on the spider in the position shown, but the core and tire are usually laid in one half and the other laid over it and clamped on, while being forced together under extremely high pressure.

The clamping pressure together with the vulcanizing heat causes the rubber to flow out into the interior of the molds and fill all impressions such as are found on the non-skid type of tires, as well as the lettering on the sides.

In making tire molds and cores for auto tires, the first consideraton is to secure proper castings; these must be good close-grained iron and homogeneous in every respect. Slight blemishes or slag holes which may appear on the surface of the core after machining are apt to prove fatal to its usefulness unless they can be properly plugged. The danger of such blemishes lies in the fact that the inside layer of fabric may be forced into them while vulcanizing, and this would form sufficient grounds for the rejection of a first-class tire when inspected and its classification as a "second." Core castings for tire sizes of 30 x 3½ in. and smaller are cast solid, with a section similar to that shown in *A*, Fig. 3; while in the larger sizes the cores are cast hollow, as at *B*, leaving a wall ½ to ⅝ in. thick after the core has been machined to finished size. Hollow cores are cast with three chambers, Fig. 4, and are later divided into three sections so that they can be easily removed from the tire after vulcanizing. Smaller sizes of tires are stretched to strip

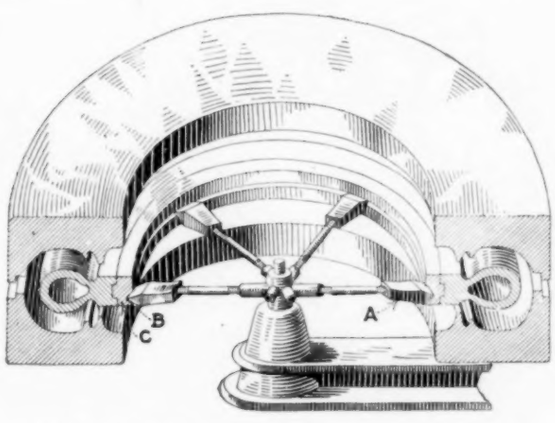


FIG. 1. PRINCIPAL PARTS OF TIRE MOLD, CORE AND SUPPORT

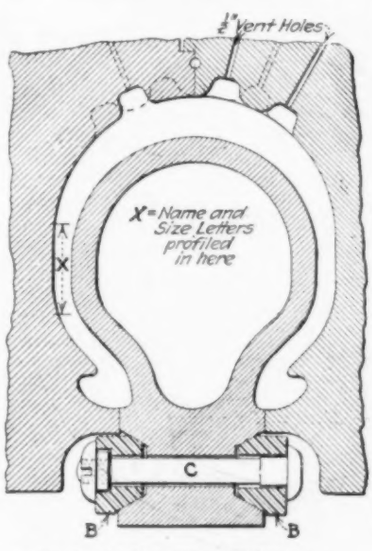


FIG. 2. SECTION THROUGH A TIRE MOLD AND CORE

AUTOMOTIVE CONSTRUCTION

them from non-collapsible cores. It will be noted that the part *A* tapers with the large end toward the center, so that it can be pulled inwardly, and the other two parts can then be easily removed.

In machining a core for small sizes of tires, the rough casting is first placed on a vertical boring mill, chucked

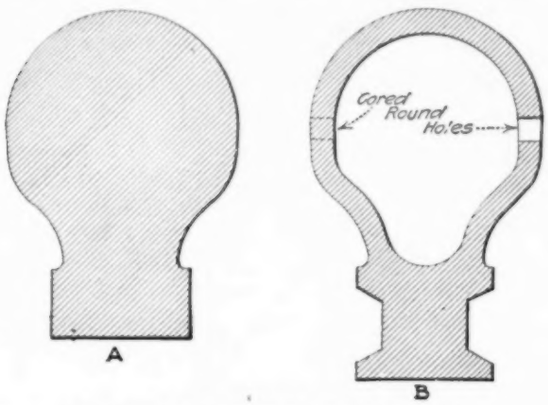


FIG. 3. SECTIONS OF TIRE CORES

from the outside, bored to size and a straight roughing cut taken from the top, Fig. 5, so that it will lie flat for the second operation. For the latter, it is chucked from the inside by jaws which do not protrude above the finished dimension of the top of the section, where the bead of the tire will lie, Fig. 6.

Any type of boring mill may be used for the first operation, but a boring mill with a side head, upon which may be mounted a former attachment, is recommended for the second and third operations, and a King boring mill equipped for the operation is shown in Fig. 7. The side and outside diameter are roughed by means of a round-nose tool held in the side head and controlled by the former, which controls the tool so that it follows the shape of the outside surface of the core. Each side is then finished by a form tool held in a goose-neck holder, Fig. 8. The core is then ready for fitting the internal steel ring, previously mentioned, which is used to take the thrust and wear from the arms of the supporting spider.

The ring is made from a suitable size of steel stock, generally ⅞ in. square. The stock is cut to length and the ends are scarfed for welding. The bar is heated to a low red heat so that it may be worked without unnecessary scaling, and is bent on a roller type of ring former, with the scarfed ends laid for a side weld. The scarfed ends are brought to a welding heat in an oil-

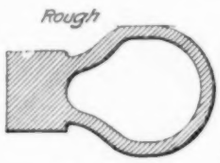


Fig. 5

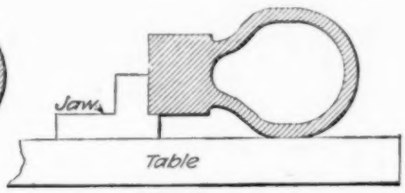


Fig. 6

FIG. 5. TRANSFORMATION OF FIRST BORING-MILL OPERATION. FIG. 6. SECOND OPERATION SHOWING HOLDING JAWS

heated furnace and the weld is made under a steam hammer.

The welded ring is rounded up on a cone former, and flattened on a surface plate. After cooling it is again straightened and is then ready for machining.

For machining, the ring is clamped in a boring-mill fixture, Fig. 9, with drawing-down screws which support it at many points to prevent springing, and arranged to permit the boring and facing of one side in the first operation. For finishing, the ring is slipped over another fixture, Fig. 10, which holds it from the inside, and the face and outside are then finished with a tongue as indicated at *A*.

The finished rings are cut across diagonally at one place at an angle of 45 deg. so that they may be sprung into place in the groove of the core casting, where they are held by pins. The core and ring are then placed on a boring mill and the V-groove is cut in the inside of the ring.

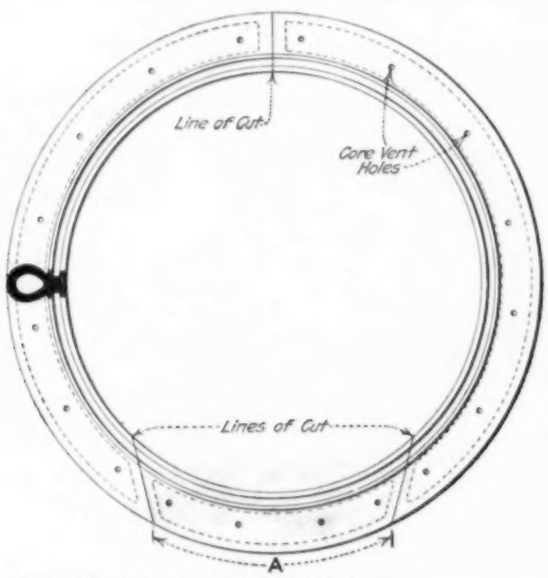


FIG. 4. OUTLINE OF HOLLOW CORE SHOW

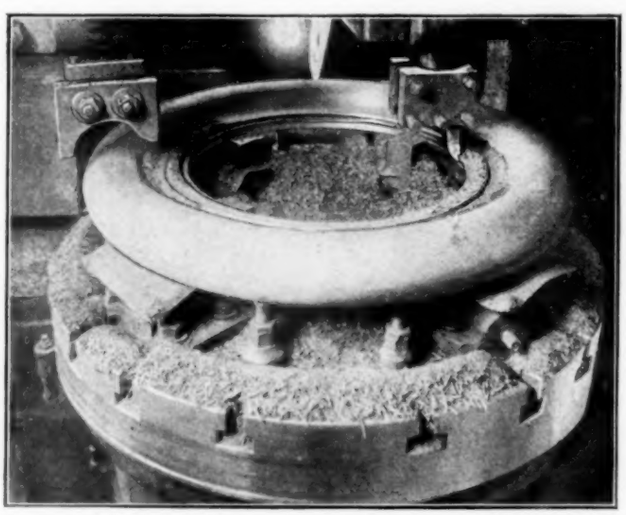


FIG. 7. BORING MILL EQUIPPED FOR FINISHING CORES

AUTOMOTIVE CONSTRUCTION

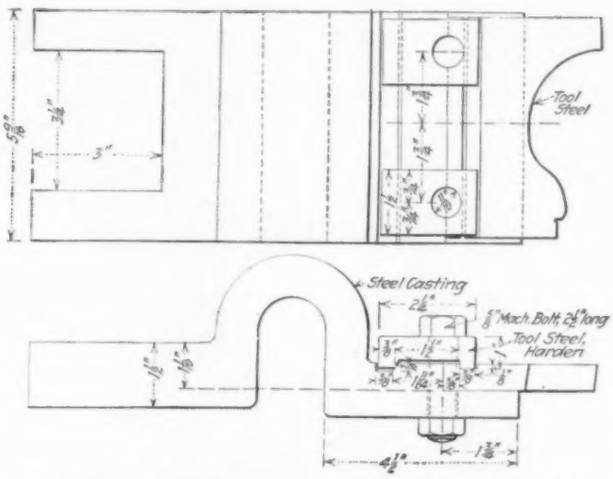


FIG. 8. GOOSE-NECK TOOLHOLDER USED ON BORING MILL

The machining of the collapsible cores proceeds in the same manner as with the solid ones until the end of the third operation, when the V-groove is cut directly in the casting, and the grooves are also finished in each side for the steel retaining rings. They are drilled for the retaining ring bolts, using a jig which spaces the holes to avoid the spots where the division sections are cut later. The retaining rings are drilled by a corresponding jig to insure interchangeability.

The cores are cut into three sections to leave a gap that will finish from ¼ to ⅜ in. in width. The ends are then fitted with steel plates, Fig. 11, which prevent wear, the plates being provided with keys, fastened in one and fitting in a keyway in the other, which assure alignment of the sections when they are reassembled. The core sections are assembled and bolted together with the side rings, and the projecting corners of the plates are finished to the contour of the core. The assembly rings are made in the same manner as the internal rings except that they are not cut diagonally in the manner mentioned. Mention has been made of the fact that the large cores are cast with three hollow chambers, and, consequently, the foundry cores are furnished to the molder

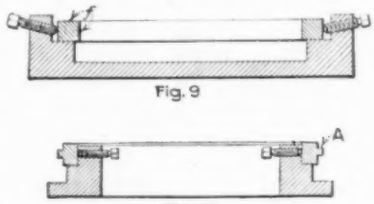


FIG. 9. FIXTURE FOR BORING AND FACING CORE RING. FIG. 10. FIXTURE FOR FINISHING OUTSIDE AND FACE OF CORE RING

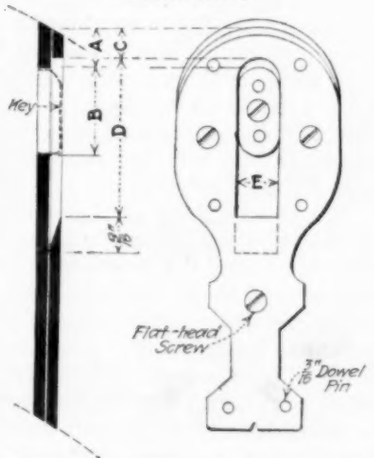


FIG. 11. STEEL PLATES FOR ENDS OF CORE SECTIONS

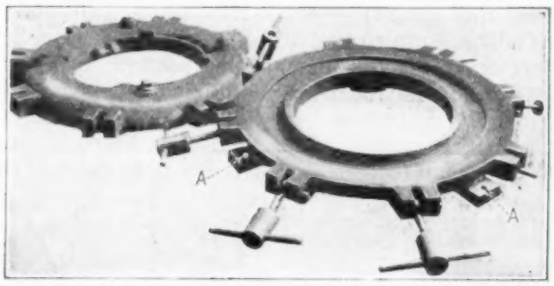


FIG. 12. A PAIR OF TIRE MOLDS WITH CLAMPS

in a corresponding form. In the foundry, the cores are supported in the mold by round projections or lugs and the holes left by them are reamed out, and through them, after machining the casting, the chambers are filled with cement mixed with water only. Before the cement has set, steel plugs are driven into these holes and after the cement has set the protruding portions of the plugs are filed to conform with the contour of the finished casting. The tire cores are cast hollow, principally to secure closer grained castings, and it is claimed the cement filler serves to overcome the expansion of the iron core when it is put into the vulcanizer

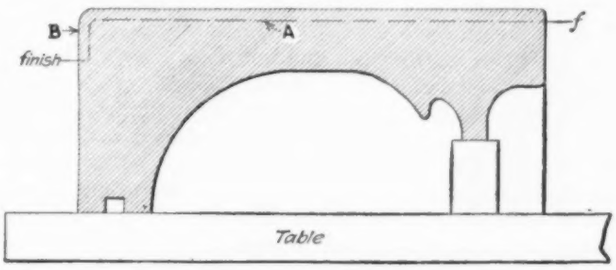


FIG. 13. TRANSFORMATION OF FIRST CUT ON BACK OF MOLD

Tire molds also must be made of close-grained iron, and in addition to this, it has been found desirable to make them with a chilled surface. The wear exerted by the tread compound of the tire when it flows during the vulcanizing process is very deteriorating on the molds, and unless they are made of particularly tough and close-grained iron, they will wear very rapidly. The iron

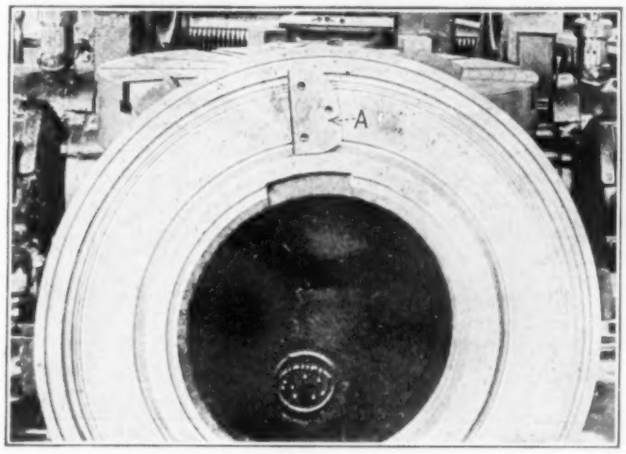


FIG. 14. TIRE MOLD SHOWING FORM-CUTTER TOOL

AUTOMOTIVE CONSTRUCTION

used for this purpose does not take a hard chill and remains soft enough so that it may be properly machined.

Some foundries put the chill and pattern together in the flask and ram them up in the mold, then draw the pattern leaving the cast-iron chill in the sand until the mold has been poured. This method is liable to cause pit-holes or chill-balls on the surface due to the fact that

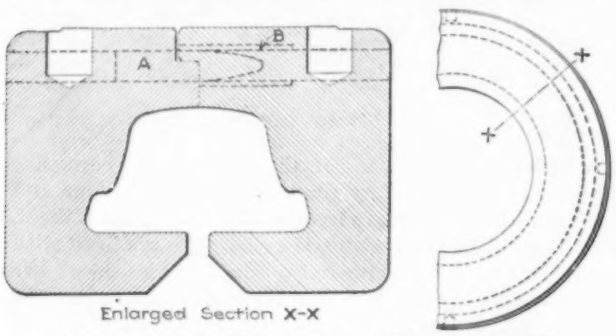


FIG. 15. SECTION OF MOLD FOR SOLID TIRE

the cold cast-iron chill collects moisture and when the molten iron strikes it an imperfect surface is the result. It is better to have the pattern made with a print to take the place of the chill, and not place the chill in the mold until just before it is ready to pour.

The mold castings are first drilled with four holes *A*, Fig. 12 (which shows a pair of completed molds), to facilitate handling. The castings are placed on a boring mill with the cavity down, and a smooth cut taken on the back, *A*, Fig. 13, and about 1¼ in. down the outer surface *B*, to facilitate future chucking operations. The mold is turned over and the cavity and joints are roughed with a round-nose tool and then the cavity is finished smooth with a form tool, *A*, Fig. 14, held in a goose-neck holder similar to the one shown in Fig. 8.

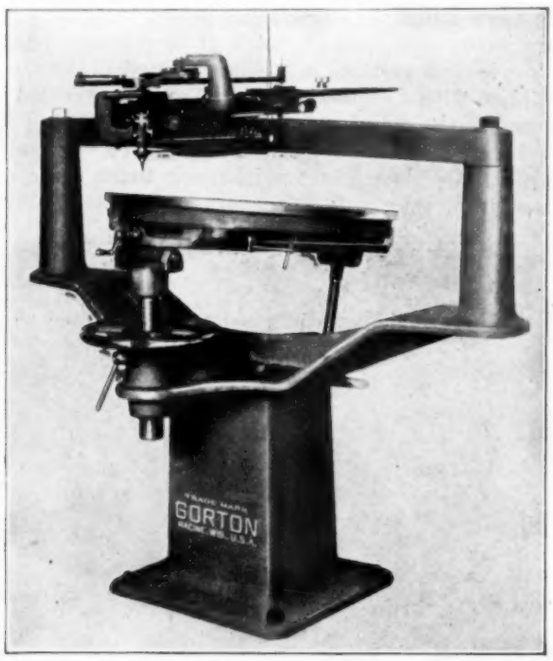


FIG. 16. ENGRAVING MACHINE USED FOR TIRE LETTERING

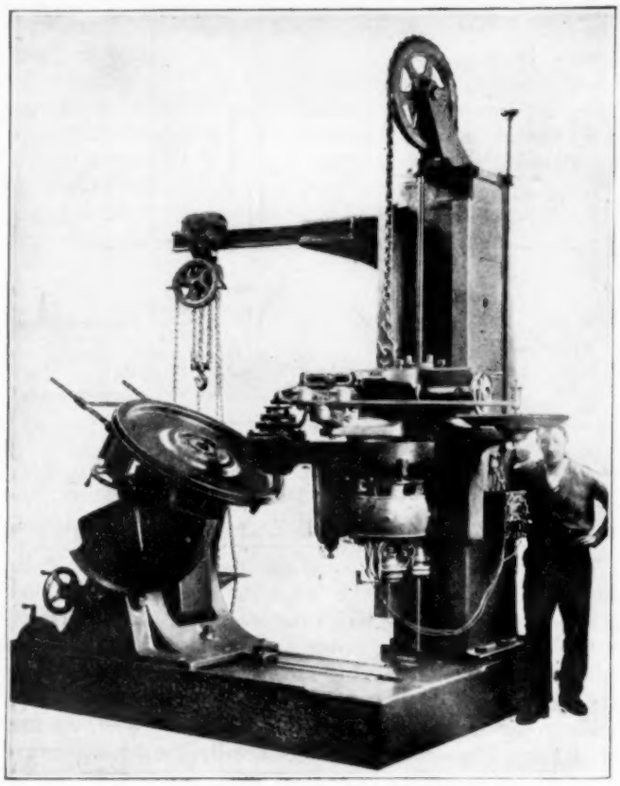


FIG. 17. MACHINE FOR ENGRAVING NON-SKID TREAD

All form tools are drilled and planed to templet, to fit the goose-neck holder, which makes them interchangeable and permits quick setting of the tools.

Molds which are intended either for plain tread or for solid tires, Fig. 15, also have each half completed as in the operation described previously. Any defects in the castings are plugged and smoothed. The molds are then placed on an engraving or profiling machine, such as the Gorton engraving machine shown in Fig. 16, where the size and name of the tire are cut in, using a templet guide for the cutter.

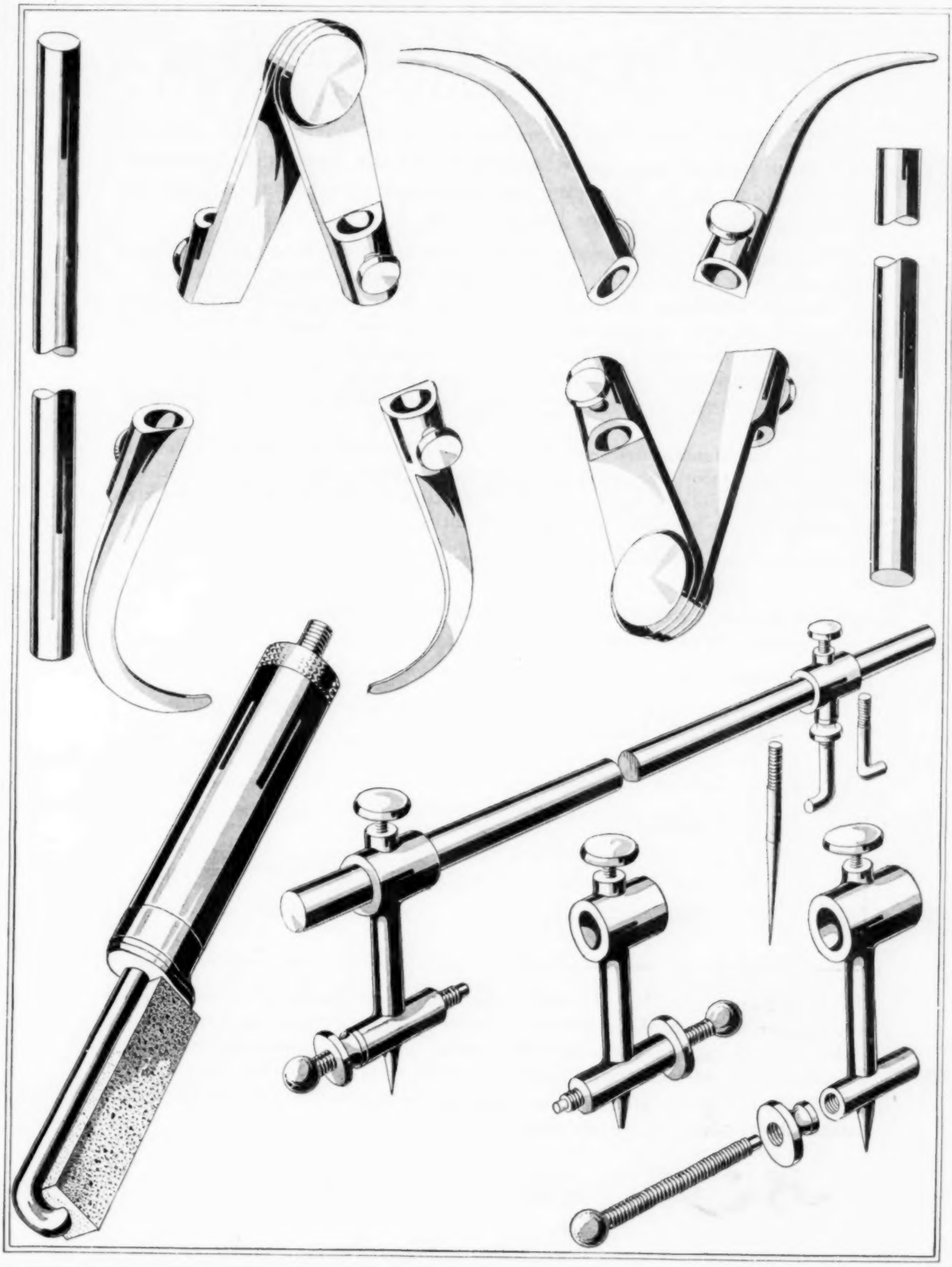
The cavities which are required to be cut in molds for the non-skid type of tires have this work done on a much larger type of engraving machine, such as the one shown in Fig. 17, which also uses templets.

Some firms require ⅛-in. vent holes to be drilled in each cavity of the non-skid tread for the overflow of the rubber, while others do not. All sharp edges and tool marks in the cavities must be filed smooth and round; otherwise they will tear the rubber when the tire is removed from the mold.

The halves of the mold are put together and located so that the designs in the tread register properly, and are then drilled for three steel dowel pins and bushings. These must be unequally spaced, so that the two parts of the mold can only be assembled in one position. The holes are drilled so that the pin *A*, Fig. 15, will have a drive fit, and it is driven through one half and into the other part way. The hole in the latter portion is then enlarged by a three-lip drill sufficient for a drive fit for the bushing *B*, which is reamed to fit the pin after it has been driven in place.

FOR SMALL SHOPS *and* ALL SHOPS

By J. A. Lucas



The Compulsory Metric Law

Read This—and Then Get Busy

THE World Trade Club is sending out to all parts of the country, thousands of post cards, addressed to the Bureau of Standards, Washington, D. C., urging legislation in favor of the *exclusive* use of the meter-liter-gram in the United States.

These cards are being signed by doctors, lawyers, school teachers and all sorts of people who know absolutely nothing of real manufacturing or export conditions.

Probably a hundred thousand of these cards have been mailed to Washington favoring one side of the question only, and many Congressmen have been led to believe, in looking over the reports on this flood of cards, that the whole country wants a compulsory metric system, when in fact nothing is farther from the truth. This dangerous propaganda *must be counteracted* by the same means the "millionaire's club" has employed.

Now—Mr. Manufacturer—Mr. Exporter—Mr. Man—**You** whose **very existence** depends on the smooth running of our industrial machinery which would be hopelessly crippled by a compulsory metric law—**all of you turn in and help in this campaign by taking up our proposition.** Also get the help of every association you belong to.

Chairman of Committee on Coinage, Weights and Measures,
House of Representatives,

Washington, D. C.

I am against all legislation tending to make the use of the metric system compulsory in the United States.

*Name*_____

*Address*_____

_____

*Vocation*_____

Here is our proposition! We will furnish you, **free of charge,** all of the post cards you can use, similar to the one shown. Distribute these cards to your employees and have them sign and mail them. The cards are all properly addressed and need only to be signed and a one-cent stamp affixed and then they are ready for mailing.

Ask us for enough cards for every employee you have and all their friends who are against the proposed compulsory metric law.

(Reprinted from our March 25th and April 15th issues)

CARDS—

Put them in your shop literature

Don't be misled by reports being circulated that no compulsory metric bill had been introduced into Congress. It is a fact that none has—and we have never said there had been—BUT—there WAS—not so very long ago—a VERY grave danger of such a bill emanating from the House Committee on Coinage, Weights and Measures.

There is practically no danger now of such a bill being introduced into THIS session of Congress, but as long as the One-Man World Trade "Club" keeps up its tactics there is always danger. And—

It is up to all of us to see that the Chairman of the House Committee on Coinage, Weights and Measures, is supplied with enough ammunition to offset the gas attack of our opponents.

We must make our position so overwhelmingly strong that the One-Man "Club," or the combined compulsory metric advocates, will be unable to make a successful attack.

This can only be done by keeping up the fight and carrying it to them on their own ground.

We have all the men who really KNOW industrial conditions on our side, but we must put these men on record.

Read the opposite page which is reprinted from our issue of March 25 and April 15, and then send for your cards for the fight is not over yet.

A good suggestion, is for you to include a card in each piece of shop literature which you send out.

One firm alone sent to us for 22,000 cards to be used in this way. Others have ordered from five to seven thousand each.

GET YOURS NOW.

Thos. Viall

Editor

Crescent Vacuum Chucks and Pumps

THE ignorance of the mechanic who attempted to hold a piece of non-magnetic material on a magnetic chuck was matched by a man of my acquaintance who built a cast-iron fixture to hold an odd-shaped piece by the same method. The fixture short-circuited the magnetic lines of force so that the work was not energized. Possibly both men could have accomplished their purposes with the Crescent vacuum chuck which is being manufactured by the Crescent Pump Co. and marketed through the Crescent Sales and Engineering Co., Detroit, Mich.

This chuck was designed for holding such classes of material as cannot be held by a magnetic chuck. Among

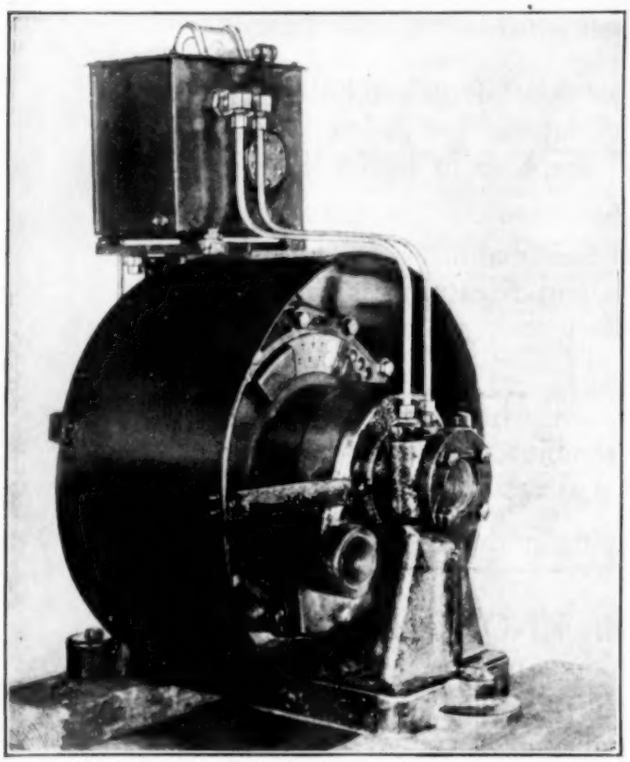


FIG. 1. INLET AND OUTLET CONNECTIONS OF PUMP

the materials which may be mentioned in this connection are brass and bronze, stellite, manganese steel and glass.

The vacuum is created by a Crescent rotary pump Fig. 1. This pump can be used either as a vacuum or pressure pump, and it is claimed that a pressure of 15 lb., or a vacuum of 28½ in. can be attained.

The intake of the pump is through the hollow center-shaft, and the outlet is through the opening seen to the left of the shaft. In the main body or case is a rotor which revolves about a stationary shaft.

The Vacuum Chuck

The interesting feature of this system to the shopman is the vacuum chuck shown in Fig. 2, as mounted on the table of a small surface-grinding machine. It

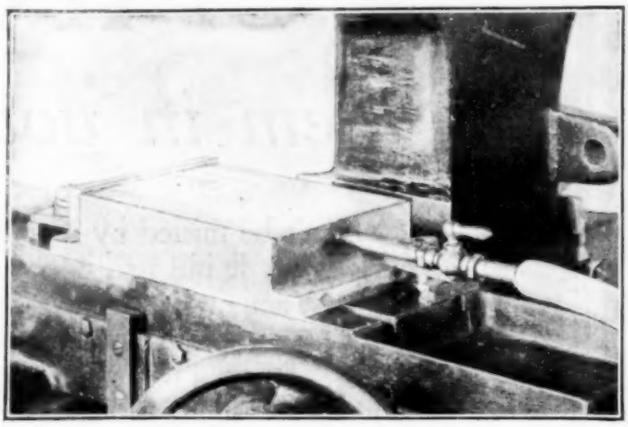


FIG. 2. SMALL SIZE OF VACUUM CHUCK PLATE WITH SINGLE GASKET

consists of a hollow cast-iron body finished square and parallel on its several faces, and provided with suitable lugs so that it may be bolted to the machine table. In one end is a pipe connected by a flexible hose with the vacuum system maintained by the pump described.

How the Chuck Works

Through the top face of the plate are drilled a series of tiny holes leading to the vacuum chamber inside. The holes may be drilled in any order depending upon the character of the work for which the chuck will be used, as in Fig. 2, or with a greatly increased number of holes for many pieces as illustrated in Fig. 3. A thin gasket, of any soft paper, is used to insure against leakage between the work and the chuck. A gasket for a single piece is shown in Fig. 2 and a larger gasket on a larger chuck plate to hold twenty-one pieces at a setting in Fig. 3.

The chuck is shown loaded with work in Fig. 4. Spaces which will not be used for the work are blocked off by laying a piece of paper over the air holes. Thin

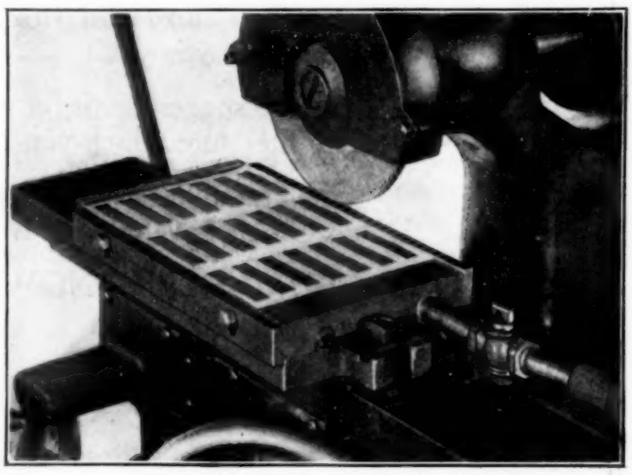


FIG. 3. LARGE CHUCK PLATE WITH GASKET FOR MULTIPLE PIECES

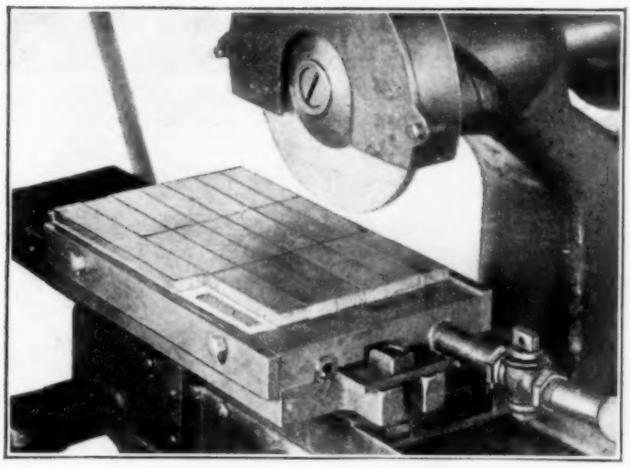


FIG. 4. CHUCK LOADED WITH PIECES FOR GRINDING

plates which are already slightly sprung can be drawn down the vacuum so that they will lie level and thus be ground to an even thickness.

New Instructional Plan at the Harvard Engineering School

The Harvard Engineering School has adopted a new plan of instruction for the junior year of the engineering course whereby students will hereafter be given an opportunity to combine classroom work with six months of active engineering practice and industrial training.

According to the new plan, which will be inaugurated in June and will apply to the instruction in mechanical, electrical, civil, sanitary, and municipal engineering, every student who wishes to take the industrial training work will spend half his time during his junior year working in industrial or engineering plants within easy reach of Cambridge. A schedule has been arranged which will enable these men to secure the full amount of regular classroom instruction and also to spend three separate periods of two months each in the industrial work. The schedule of work for the freshman, sophomore, and senior years will remain approximately what it is now, so that students in the engineering school will fully retain during at least three years, and also during part of the junior year, the advantages of life in the college surroundings which the school now affords.

The plan has received the support and encouragement of the Associated Industries of Massachusetts, comprising some 1,400 industrial and engineering concerns.

It is expected that the students who go into this work will be paid current wages for the periods in which they work in the plants and that they will be able to earn sufficient money to pay their expenses during these periods, so that the experience, if not actually profitable, will at least not be a financial burden. The plan will be optional on the part of the student.

Students will be placed in industrial plants, engineering works, and public service companies. They will be engaged in the making of steam and gas engines and auxiliary machines, of electrical machinery, of textiles, of rubber and leather goods, of paper and paper pulp. They will be employed by railroads, traction companies, and contracting firms, and will work in foundries, machine shops, and electric light and power plants.

Professor Hector J. Hughes, chairman of the administrative board of the engineering school, today explained the purpose and development of the new plan as follows:

"One of the first problems which the staff of the new engineering school set itself to solve was to find an effective way of getting the new school and its students into closer relations with industrial and engineering work before they graduate. The need for such relations has been increasingly evident in the past few years. The object of such co-ordination is manifold: To stimulate interest in the classroom work; to keep the teaching staff well-informed of the needs of industry and how to train engineers to meet them; to give the students some intimate knowledge of the great problems of labor and industry which they have to meet after they graduate, and thus to anticipate to some extent the period of initiation which all students must go through and better to fit them to begin their careers; to give them an opportunity to discover how intricate and interesting the basic industries are and to what extent scientific knowledge may be used in work which is too frequently looked upon as non-technical; in other words, to find out how many kinds of careers are open to technically trained men and how wide is the opportunity for such men. Another object of the new plan is to stimulate the interest of the industries themselves in the adaptation to their special needs of education in engineering.

"To sum up, the object of such co-ordination is to give our students the chance to find themselves.

"The most promising solution of this problem seemed to the staff to lie along the lines of the highly developed and successful plan of industrial co-operation which was initiated by Dean Schneider at the University of Cincinnati and has been carried on there so successfully for many years, and has been applied in a modified form at the University of Pittsburgh also. This plan has been modified still further to meet the different conditions and needs at Harvard. It is significant that other universities are now moving in the same direction, and within only a few days a large movement has been inaugurated to put such a plan ultimately into effect in most of the large technical schools.

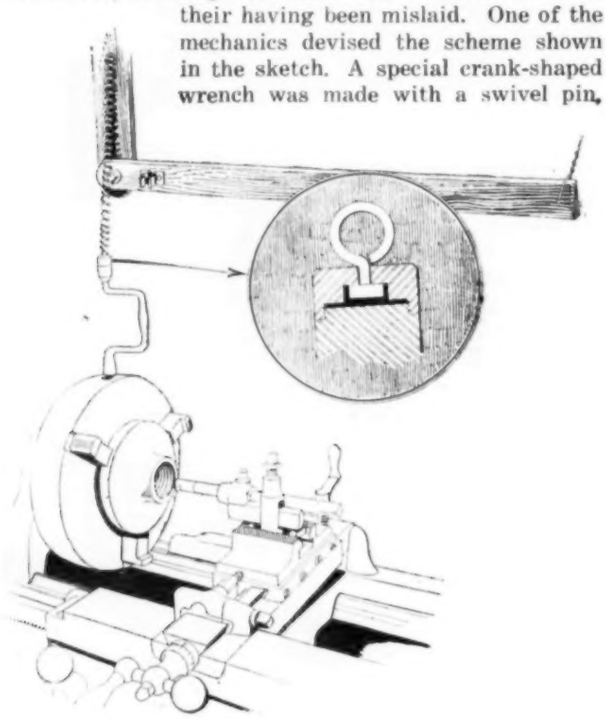
"After a thorough study of the situation, the staff came to the conclusion that it would be highly desirable to offer our students an opportunity to get some industrial experience and engineering practice while undergraduates but without sacrifice of classroom instruction and without depriving them of the many advantages which attach to residence and study, under teachers interested in other subjects than science, and among students of widely differing interests. In other words, we feel that our students should have as many as possible of the benefits which we know will come from connection with the college, while they are at the same time carrying on their engineering studies. For this reason and because it does not seem desirable to lengthen the period required for a first degree beyond four years, we shall be limited at the outset to less industrial experience than perhaps would be desirable. The amount offered, however, should be looked upon as a minimum and we have no doubt that many of our students will be glad to avail themselves of the opportunity to take more of this work after the plan is in operation.

"Mr. H. V. Drufner of the University of Cincinnati has been secured to take active charge of the technical work of putting the new plan into operation."

A Handy Chuck Wrench

By C. H. Willey

In a repair shop where several lathes were in use with interchangeable chucks there was considerable time wasted hunting for the chuck wrenches due to their having been mislaid. One of the mechanics devised the scheme shown in the sketch. A special crank-shaped wrench was made with a swivel pin,



KEEPING TRACK OF THE CHUCK WRENCH

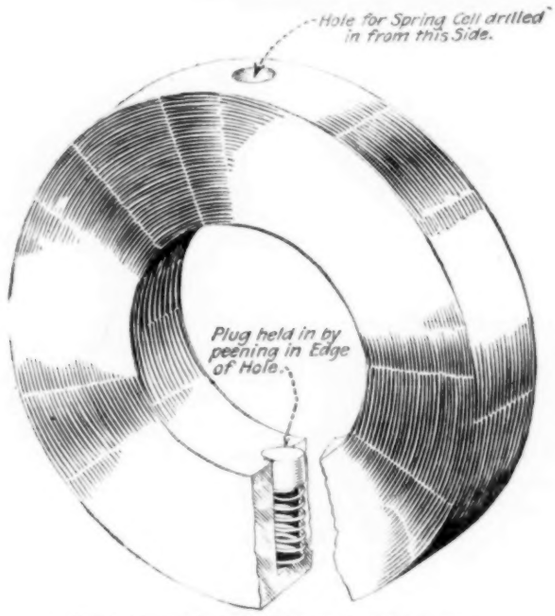
shown in enlarged section, in the top. The upper end of the spring was secured on the vertical shipper bar. When not in use the spring raised the wrench and the operator would place it in the spring clips indicated. This idea is a labor and time saver that has proved very handy and valuable.

Device for Babbitting Bearings

By Richard H. Kiddles

We have a device for use in babbitting bearings that has been in service for a long time and which, we think, is handier than the one shown by John Vincent on page 305 of the *American Machinist*.

Instead of separate springs to hold the collars together we have a stiff coil spring set in a cell in each collar. Wherever the collar may be placed on the arbor, it is held with sufficient friction to withstand any pressure that may be brought to bear on it when pouring



COLLAR FOR BABBITTING BEARINGS

small bearings, and yet is readily adjustable by hand without the use of a wrench or other loose part.

The illustration shows the manner in which it is made and its action is obvious.

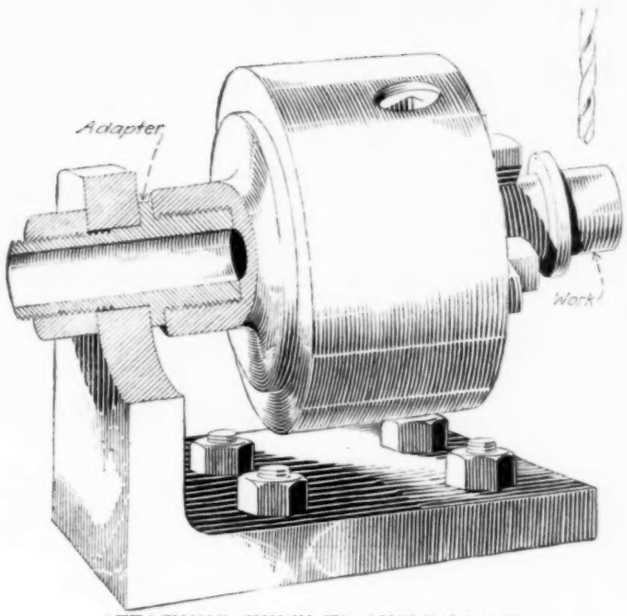
Adapter To Hold Lathe Chuck on Angle Plate

By H. H. Parker

Some pieces of work of the character shown in the sketch are difficult to hold for drilling, either in V-blocks or in a vise.

A convenient way to hold such work is to turn a piece of cold-rolled steel and thread both ends, one the same as a lathe spindle nose and the other to take a nut to hold the adapter to an angle plate. If the adapter is drilled through the center the same size as the lathe spindle hole, long pieces may also be held.

If it is not already drilled, the angle plate is provided with a hole through its upright face to take the adapter.



ATTACHING CHUCK TO ANGLE PLATE

For ordinary small work the chuck will probably screw up tight enough without any special means being necessary to hold it in place.

Quick-Acting Machine Vise

By H. W. Belmont

After searching the market without success for a quick-acting machine vise of large capacity we decided to design and make one to suit our requirements. Inasmuch as this vise proved very satisfactory we thought that other readers of the *American Machinist* would also have use for it, as the quick-action features are also adaptable to jig and fixture work. The body has a dovetailed slot up to the rear jaw and a rectangular hole through the jaw. The member *A* slides in the body, the movable jaw *B* sliding with it. The vise operates as follows: Insert work; push up the member *A* until the movable jaw is against the work; then turn the screw to the right, this action driving the cam *C* to the right through the friction drive, throwing the plunger *D* into the ratchet *B*; after which another eighth of a turn tightens the work. To remove the work, simply turn the screw to the left, turning with it the cam, thus allowing the spring to raise the plunger from the ratchet and the sliding member *A* to be drawn back.

The friction drive of the cam is accomplished through the spring *E* which forces the cam against the collar of the screw. The cam has eight drill spots in it as shown in section *A-A* and eight pins *F* ride in the drill spots, making an efficient drive for the cam and allowing the screw to continue to tighten the movable jaw. The sliding member *A* is dovetailed into the body and the movable jaw is dovetailed into the sliding member. *G* is a pin to prevent the ratchet plunger *D* from turning. This vise is used on milling and shaping machines.

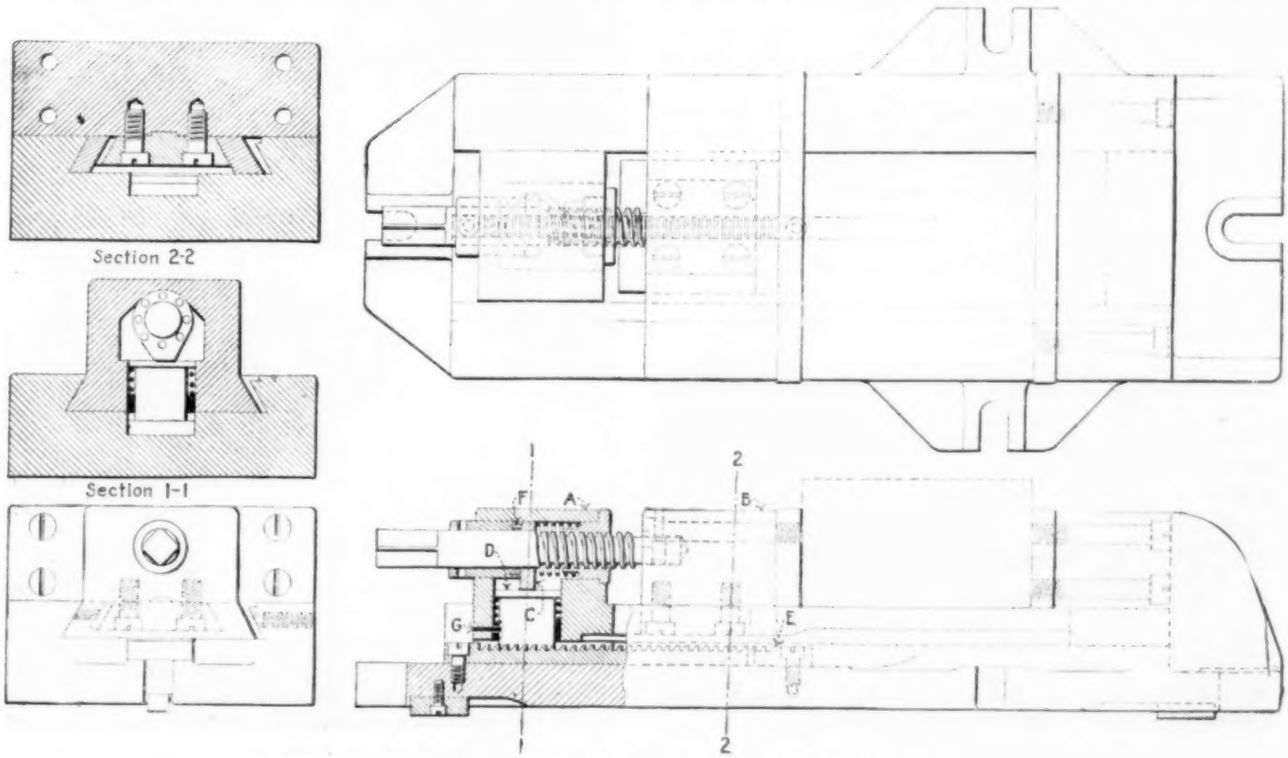
Novel Way of Making a Pattern

By A. Briechle and Max Schuppe

A small number of cast covers for a certain instrument were wanted. They would ordinarily have involved the making of a drawing and the usual form of a wood pattern and entailed an expense that would have made the cost of the job practically prohibitive.

A novel idea was evolved and put into practice. A block of wood was made to conform to the size and shape of the desired cover and a sheet of lead about ⅛ in. in thickness was drawn and molded over the block, the joints being carefully soldered and scraped.

The block of wood may be seen at *A* Fig. 1, and the



QUICK-ACTING VISE FOR MILLING MACHINE

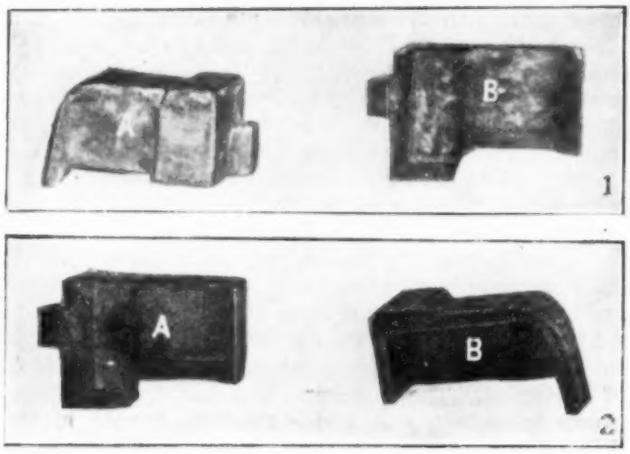


FIG. 1. WOOD BLOCK AND LEAD CASE. FIG. 2. LEAD PATTERN AND RESULTING CASTING

sheet lead pattern at *B*. In Fig. 2, *A* is the lead pattern and *B* the casting made from it.

Using this lead casting as a pattern, some remarkably clean castings were obtained, and the pattern could with care be used over and over again, whereas a wood pattern as thin as this would be extremely liable to injury.

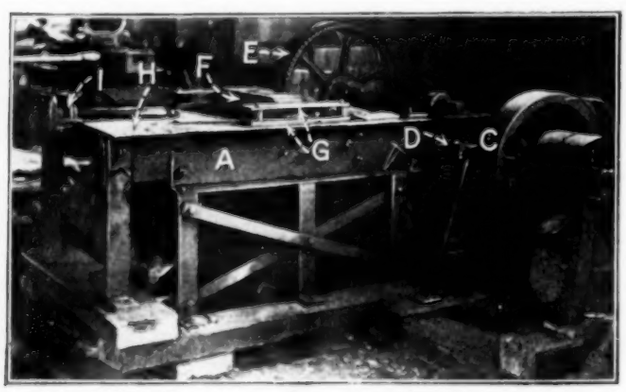
The cost of the lead pattern was about one-third that of a wood pattern, and it possesses the additional advantage that after it has outlived its usefulness as a pattern it may be made into sinkers.

A Home-Made Bending Machine

By H. J. Ventner

A machine and forge shop in one of our large cities had a limited amount of bar bending to do for use on ornamental railings and constructed the home-made bending machine shown in the illustration to handle the work. Nearly every piece used in making this machine was picked up from the scrap pile in its own yard.

I-beams, *A*, lined with a stiffening channel are used on each side to form the bed. These are braced in position by heavy flat bars which are also used for legs extending to the timber foundation. The crank was made of a heavy piece of shafting, forged with a throw in its center to give it the required amount of travel to the crosshead. The ends of the shaft and the crank bearing were then turned so that they would run true.



A HOME-MADE BENDING MACHINE

The driving shaft, in addition to the pulleys, carries a fly-wheel *C* to aid in carrying the crank over center when bending. The reduction gearing *D* from this countershaft is again augmented by a second reduction to the gear *E*. The diehead *F* is probably the only casting made especially for this machine. It slides between guidebars *G* which are bolted to each side of the frame.

The stationary die is bolted to the plate *H* on the bed and backed up by a thrust block *I* which has an adjusting screw that can be set up against the die. One of the recent jobs successfully bent on this machine was the bars for the railing of one of Chicago's new bridges.

Keeping Mosquitos Out of the Shop

By Frank C. Hudson

If you are bothered with mosquitos breeding in standing water round your shop it is worth while to try the plan they use in Panama and other places. The picture is from the Navy Yard at New Orleans and shows how little apparatus is required.

The apparatus consists of an old tomato can tied to a stick, the stick being driven down into the mud, preferably at an angle as shown, and a wick which runs from the bottom of the can out through a small hole near the top and down into the water.

Fill the can with kerosene or almost any sort of oil that will feed the wick and the outfit needs no attention so long as the oil lasts; the oil feeds gradually from the can to the surface of the water and soon covers it with a film of oil. It only takes a very thin film of oil to discourage the breeding of mosquitos, but it must be kept up for they are persistent critters and seem to lie in wait for a chance to get busy again. This has proved an effective method of extermination.

THE ANTI-MOSQUITO OIL CAN

WHAT *to* READ
—for the man in a hurry

Suggested by the Managing Editor

Most of the prominent presidential candidates have announced their faith in education as a prime necessity for America. We indorse this stand without reservation. Many men in our field have had neither the time nor the money for the advantages of a college education but this is no indication that they are uneducated. To many such men "American Machinist" has been an invaluable aid. It is our aim to make it indispensable and certain comments that have come to us make us believe that we are on the right road.

TO PROVIDE a little variety we are leading off this week with a Navy Yard story — this time a short account of the yard at New Orleans and its work during the war. Being a relatively small yard it had more intimate acquaintance with submarines and subchasers than with dreadnoughts and battle cruisers. Much repair work is done here and the equipment is correspondingly diversified.

The current installment of "Modern Production Methods" is called "Engineering the Product," and begins on page 1087. Mr. Basset takes up briefly the functions of a well-organized engineering department and also points out its limitations. As usual he uses concrete examples to prove his statements. This article should appeal both to engineers and to general managers.

Another article dealing strictly with management problems is the one on page 1091 by John T. Bartlett concerning employees' magazines. Most of us have seen house organs of promise spring up like mushrooms and last but little longer. The management may have had the best intentions in the world and the editor may have been as conscientious as he was clever but still there was something missing and the result was failure. Mr. Bartlett takes up policies for employees' magazines in a broad gage way that merits close attention.

The third installment of Sherlock on insurance policies starts on page 1084 and takes up the matter of premiums and their importance. For some months we have run solid pages of illustrations showing shop and drafting room kinks, and just after the armistice a few on mechanical hands and arms for disabled shop men. One appears on page 1103. These were drawn by J. A. Lucas who was recently made head of the illustration department for all McGraw-Hill papers. Instead of photographing Lucas we thought it more appropriate to have him drawn from life by Breul whose desk faces Lucas' and who consequently had a fine chance to complete the job without Lucas knowing anything about it. Lucas was born in Toulon, France, and graduated from the Paris Polytechnique. He has been in this country thirteen years, eight of which have been in the employ of the McGraw-Hill Co., Inc., and its predecessors. A critical analysis of the sketch will indicate to the careful observer that Lucas is—not fat, for a Frenchman could never be that—but that he inclines to embonpoint, or in other words carries around with him somewhat more avoirdupois than might be considered essential by some people. He is responsible for the perspective sketches and drawings which are used to such a large extent as illustrations for our practical letters. His experience as a machinist and expert photographer has stood him in good stead.

The Theory and Practice of Lubrication—The Germ Process*

By HENRY M. WELLS and JAMES ED SOUTHCOMBE

If costly bearing friction can be greatly decreased through the application of improved lubricant, and the cost of the lubricant itself reduced by the use of hitherto so-called impurities, we shal have taken another big economic stride.

IN THE early days of the mineral lubricating oil industry, it was considered that the perfection of lubrication lay with the production of the purest possible hydrocarbon oils, and it is a monument to the skill and efficiency of oil producers and refiners that this search for better lubricants and more scientific methods of refining has resulted in placing upon the market an enormous range of highly purified lubricating oils of every conceivable viscosity, gravity and color. This has certainly very materially conduced to lubricating efficiency and has been instrumental in assisting forward to the greatest possible degree the development of engineering design. Nevertheless, we find that for many purposes, particularly those cases requiring lubrication of bearings, etc., carrying heavy loads at relatively slow speeds, these pure mineral oils have not been ideally successful. And the need for adding to mineral oils, animal and vegetable oils to increase their "slipperiness," has been forced upon users in all countries. To take a few examples out of many, the specification for lubricating oils of the United States railways, drafted at a recent conference, recommends the addition of 4 to 8 per cent of fatty oil, and in Great Britain many large consumers of lubricating oil, the railway companies and the Government departments, emphatically specify oils containing up to as much as 20 per cent of pure rape, olive, lard, or cocoanut oils. The fact that such compounded oils possess exceptional friction-reducing properties has been shown by a large number of trials and experiments on mechanical testing devices and is supported by the observations in practical lubrication on many hands.

An Extensive Industry

There has grown up with the development of mineral oils an extensive industry for the production of fatty oils to be used in compounding with hydrocarbons. Here again, the demand for greater purity and freedom from acidity of glycerides has been insistent and has seen the marketing of expensive acidless tallow oils, acidless lard oils, etc. It is our object in coming before you to show that such highly refined oils are not only unnecessary but are positively ineffectual in securing the highest possible degree of friction-reducing efficiency.

We were forced to the conclusion that the only property which was of importance and which had previously not been adequately studied, was capillarity or surface tension. Consider the case of two eccentric glass surfaces which are being forced together with a drop of oil or mercury between them. Now, since the mercury does not wet or spread over the glass, the meniscus in this case will be convex to the liquid, while in the case of oil which wets the surface, the meniscus will be concave In the first case, the tendency on capillary grounds will be for the liquid to gather itself up into a drop and to pull the liquid film away from the narrower constricted area of greater pressure. In the case of oil, the opposite will be the effect. The oil, owing to its meniscus, will tend to force itself into the narrow spaces. This is exactly what is required in a lubricant, namely, that it shall penetrate into the narrow spaces between journal and bearing and from the above considerations, one clearly sees that liquids which do not wet solid surfaces cannot be described as lubricants. Only the liquids which wet the solid surfaces possess lubricating power in the generally accepted sense. This confirmed to us that a measure of the surface tension would shed considerable light on the problem and to this end we now devoted our attention.

It was found that the interfacial tension against water, and also against mercury, of the fatty oils and compounded oils, was much *lower* than was the case with any mineral oil.

What Investigation Showed

After a great amount of investigation, we definitely proved that this difference was due to the presence in the fatty or compounded lubricants of small quantities of free, fatty acids which are absent in the great majority of mineral oils. This was a most surprising result since it indicated that the virtue of fatty oils arose simply from the fatty acids which they contained, as impurities. We then went a step further in that we artificially prepared oils consisting of 99 per cent mineral oil with only 1 per cent of free fatty acid. These oils gave a low surface tension. On the other hand, we removed the fatty acid from fatty oils and found that the pure fatty oils gave a high surface tension. We drew the deduction, therefore, that the friction-reducing properties were due solely to the fatty acid content and that it should be possible to obtain the desired result by adding minute quantities of fatty acids to mineral oils. At this point it became essential to confirm the results by direct experiments on bearing surfaces.

The broad set of tests and results from the four machines were these: The oils used by way of illustration were a pure mineral oil, the same mineral oil plus ½ per cent commercial fatty acids, the same mineral oil plus 1 per cent and 2 per cent fatty acids. These were tried out against rape oil containing 2.4 per cent of free fatty acids and neutral rape oil from which the fatty acids had been completely removed in the laboratory. In every case, on each machine the frictional resistance, when 1 per cent of fatty acids was used, was reduced by 20 to 26 per cent and to achieve this reduction by the use of pure neutral rape oil it was necessary to employ as much as 60 per cent. Further experiments made with olive oil showed that

*Extract from paper delivered at the meeting of the National Petroleum Association at Pittsburgh, Pa., April 22, 1920.

the addition of 2 per cent of commercial fatty acids lowers the friction 30 per cent below that of a mixture containing 40 per cent mineral and 60 per cent olive. To put the matter in a nutshell, the *frictional resistance shown by any mineral oil can be most definitely reduced by the addition of about 1 per cent of commercial fatty acids.*

This is in complete conformity with the latest views of pure science. All recent work points to the fact that it is the chemically reactive and unsaturated constituents of lubricants which promote "oiliness" and that they do so by forming new "composite" films on the surfaces lubricated, with lower surface energy and opposing less resistance to shear. The great activity of organic acids is quite in accordance with this theory.

Growing Use of Germ-Process Oils

We have hitherto confined our remarks to the effects of acids on the friction-reducing properties of oils, but there is another aspect of the matter of very utmost importance. In practical use in the power house or factory, lubricating oils are not used under ideal conditions, and in many cases they become admixed either accidentally or deliberately with water. In some cases it is necessary that when the oil comes in contact with water, it shall mix with the water or emulsify as we say. Such cases are, of course, the bearings of marine engines and the guides and rods of locomotives, etc. In other cases, it is essential that the oil shall not mix or shall separate readily from the water.

We found also that it is possible to choose suitable acids which will confer upon the mineral oil these particular and valuable properties. By the addition to the mineral oil of one class of fatty acids, we induce a tendency to de-mulsify, while other groups of acids have a powerful emulsifying influence. We are therefore enabled to change the character of the mineral oil.

Germ-process oils have been extensively tried out by the British Admiralty, Government Departments, Steamship and Railroad Companies, without a single failure being recorded.

On large gas and oil engines, especially big horizontal units, where previously 10 per cent fatty oil was used, we have been able to substitute germ oils with 1 per cent fatty acid and achieve complete success.

"Germ-process" oil, incorporated in very small proportions with the correct mineral cylinder oil, gives equally good results on engines with Corliss valves up to over 3,000 hp., working at 160 to 170 lb. per square inch pressure, superheated 480 to 500 deg. F.; on horizontal engines with Corliss valves up to 750 hp. up to 160 lb. pressure without superheat. Various mineral cylinder oil bases to correct "germs" in different but small proportions give thoroughly good lubrication on vertical and horizontal engines of many types, sizes and pressures.

For a good heavy marine engine oil it has always been considered necessary to use from 10 to 25 per cent thickened or blown oil—as a rule, thickened rape oil. This gives great viscosity, also very good "lathering" properties to the oil.

The standard specification for marine bearing oil for one of our semi-government departments is a compound of about 20 per cent of fatty oil; but the total fatty acid content must not exceed 1 per cent. This has now been successfully replaced by germ-process marine-engine oil.

The germ process gives to a mineral oil of *fair* merit, that property lacking for some purposes, while it increases the lubricating value of a good oil, making it still better. In all cases they become more economical.

One excellent illustration of this may be of interest: On a Navy ship of the cruiser class the port engine was run on a straight mineral oil and the starboard on a germ-process oil. It was found possible to reduce the oil feed on the starboard engine and the engineer officer reports that he would be quite willing to run the engines on the germ oil with a reduction of 17 per cent consumption.

We should mention here that this process has been protected by patents in all countries.

Conclusions Reached from Tests

Our task is to estimate how the industry will be affected by the following two factors: One technological, one psychological. The first is the technological factor; namely, the demonstration of a new set of facts. In our previous remarks we have given the conclusions to which we were led by exhaustive research in the laboratory followed up by convincing measurements of frictional coefficients and confirmed by thorough trial for many months in commercial practice on the largest and most varied types of bearing surfaces. These conclusions are briefly:

(a) That 1 per cent of free fatty acid will lower the frictional coefficient of a pure mineral oil by 26 per cent.

(b) That although such germ-process oils are only fractionally dearer than pure mineral oil, their value as lubricants is the same as, or better, than that of heavily compounded oils or straight fatty oils.

(c) That a logical reason has been given for the superior oiliness of compounded oils over mineral oils; namely, that the fatty acid present as impurity lowers the frictional coefficient.

(d) That there is no more danger of corrosion when using germ-process oils containing limited amounts of fatty acids than when using compounded oils, and in many cases the danger is much less.

(e) In a word, these new facts may be summarized by saying that it is now possible to combine the oiliness of fatty oils with the cheapness of mineral oils.

The psychological factor is this: That the oil user has now found that one of his most cherished prejudices has gone by the board; namely, the old bogey of free fatty acidity. At the meeting in London, large oil users were present. They admitted that the new process produced oil of superior friction-reducing properties and they were in no way perturbed by the presence of a minute quantity of free fatty acid in controlled amount. The user is therefore now prepared to reconsider the whole question of specifications for lubricating oil and to revise his old standards.

Economic Possibilities of New Process

We suggest that this will help the refiner. He will now find that the user will listen to his views and will co-operate with him in using the lubricant best suited for its work. The refiner will now be in a position to modify the properties of his oils at will. It is as if he were presented with a key which unlocked many doors. If he wishes to reduce friction, he can do so. If he wishes to make an oil emulsify, he can do so. If he wishes to prevent an oil from emulsifying, he can do

so, and these modifications can all be made with minute quantities of substances which are cheap, are universally soluble in all oils, and impart their beneficial effects between bearing surfaces of all metals so far investigated.

The producer will now be able to make cheaper mineral oils do the work of the more expensive ones, because he can rely less on *high viscosity*, and more on the addition of *fatty acid*.

It seems clear that there are great economic possibilities in a process which yields oils which the consumer will insistently demand on account of their higher efficiency, certainty and economy, and achieves these results while facilitating the task of the refiner by enabling him to utilize cheaper products for higher-priced purposes, and securing greater control over the properties of the finished product.

Machine-Tool Safety Standards for Pennsylvania

The Industrial Board, Commonwealth of Pennsylvania, will hold public hearings upon rules relating to the operation, use and maintenance of machine tools, at Philadelphia, Hotel Bellevue-Stratford, on May 24, and at Pittsburgh, Headquarters of the Department of Labor and Industry, Public Safety Building, on May 28. The following is a tentative draft of the rules:

Section 1. Administration

The rules set forth in this standard shall apply to every establishment within this Commonwealth.

(a) No person or persons shall remove or make ineffective any safeguard, safety appliance or device attached to machinery except for the purpose of immediately making repairs or adjustments; and any person or persons who remove or make ineffective any such safeguard, safety appliance or device for such repairs or adjustments, shall replace the same immediately when such repair or adjustments are accomplished.

(b) Every employer or person exercising direction or control over such person or persons who remove such safeguard, safety appliance or device, or over any person or persons for whose protection it is designed, shall have the safeguard, safety appliance or device so removed promptly and properly replaced.

(c) Every employe shall be responsible for carrying out all standards which may concern or affect his conduct, and shall use all safeguards, safety appliances or devices furnished for his protection.

Section 2. Definitions

For the application of these rules:

(a) The term ESTABLISHMENT shall mean any place within this Commonwealth where work is done for compensation to whomever payable, supervision over which has been given by statute to the Department of Labor and Industry.

(b) The term MACHINE TOOL shall mean any power driven machine which employs a tool for working on metal.

(c) The term HAZARDOUS shall mean that the location of an object is so accessible as to permit of contact which may result in injury.

(d) The term GUARDED — ENCASED — ENCLOSED shall mean that the object is so covered, fenced or surrounded that contact which may result in injury, at the point of danger, is remote.

(e) The term DEPARTMENT shall mean the Department of Labor and Industry.

(f) The term BOARD shall mean the industrial Board.

(g) The term COMMISSIONER shall mean the Commissioner of the Department of Labor and Industry.

(h) The term APPROVED shall mean approved by the Industrial Board.

Section 3. Specifications

NOTE: E-I—Existing Installations
N-I—New Installations
A-I—All Installations

RULE 94. (A-I) Each machine tool shall be provided with a starting and stopping device accessible to the the operator, such as belt shifter, clutch, switch, etc., which affectively controls the machine tool. (Machine tools that are part of a unit where the starting or stopping of one machine would interfere with others of the unit, are excepted.)

RULE 95. (A-I) Clutches and couplings shall be of the safety type with nuts and bolts countersunk or protected by a flange.

RULE 96. (N-I) All face plates, chucks and collets shall be cylindrical with no projecting parts beyond the rim.

RULE 97. (A-I) All openings in bed frames on planers and boring mills shall be covered with a sheet metal apron substantially fastened in place. All openings in housing shall be guarded.

RULE 98. (A-I) All planers shall have not less than twenty-four inches clearance at both ends of travel of the planer table, the work being machined and its chucking. When the clearance is less than twenty-four inches the space shall be guarded with standard railing.

(a) Balconies or runways of machine tools shall be considered working platforms and so guarded.

RULE 99. (A-I) Material being worked on hollow spindle lathes shall be guarded full length back of chuck while revolving.

RULE 100. (A-I) Cams shall be guarded.

(a) Counterweights which present shearing or crushing hazard when exposed to hazardous contact shall be guarded.

RULE 101. (A-I) Chip guards shall be provided at machine tools where there is an eye hazard from flying chips or cuttings.

RULE 102. (A-I) The practice of changing stops (dogs) is prohibited while the planer table is in motion.

(a) Oiling of moving parts of machine stools is prohibited.

(b) Cleaning of machine tools while in motion is prohibited.

(c) Riding upon machine tool table is prohibited.

RULE 103. (A-I) Revolving setscrews, coupling, clutches, keys or other projections not encased by the housing of the machine, when exposed to hazardous contact, shall be guarded.

(a) The covering of setscrews with leather or wood blocks is prohibited.

(b) All spoke pulleys shall be guarded.

Violation of these rules would entail a punishment of fine or imprisonment. Arrangement is intended whereby the Industrial Board may be petitioned to modify or suspend any rule. It is intended that the provisions of all safety standards not specifically covered by the standard under consideration shall apply in all matters involving the life, limb, and health of the worker.

We received several drums of plastic molding material that had an excess of moisture, and having a large steam-heated tank for vulcanizing under pressure I desired to use it for drying the molding material in vacuum. I therefore ordered the millwright to connect up a pump to the tank as quickly as possible.

He said he would rush the work; and in a few hours he was back saying, "I have her all connected up; but where shall I put the other tank? "What other tank?" says I. "Why the tank to pump the vacuum *into*."

E. F. Creager.

SHOP EQUIPMENT NEWS

-Edited By-
E. L. DUNN and S. A. HAND

SHOP EQUIPMENT • NEWS •
A weekly review of modern designs and • equipment •

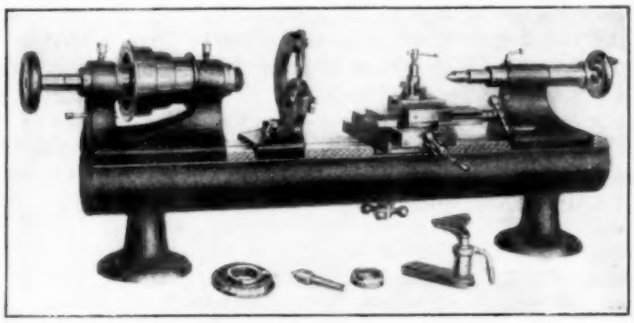
Descriptions of shop equipment in this section constitute editorial service for which there is no charge. To be eligible for presentation, the article must not have been on the market more than six months and must not have been advertised in this or any previous issue. Owing to the news character of these descriptions it will be impossible to submit them to the manufacturer for approval.

• CONDENSED • CLIPPING INDEX
A continuous record of modern designs • and equipment •

P. M. C. Precision Bench Lathe

The Package Machinery Co., Springfield, Mass., has brought out the precision bench lathe shown in the illustration. The special features of this lathe are: Ball thrust-bearings in headstock; split-nut clamp in tailstock, and adjustable nuts on the compound-rest feed screws.

The countershaft can be furnished with either bench or wall hangers. Two sets of tight and loose pulleys are furnished, permitting two speeds. The large pulley for driving, milling and grinding attachments is made of aluminum, thus reducing the inertia of the countershaft. Specifications: Length of bed, 36 in. Distance between centers, 16 in. Swing over bed, 8½ in. Collet capacity, ⅜ in. Diameter of spindle nose, 8½ in. Thread on spindle nose, 12 per inch. Speeds (6), 350 to 1,200 r.p.m. Bench space, 6 x 39 in. Weight, net, including countershaft, 235 lb., boxed 295 lb.



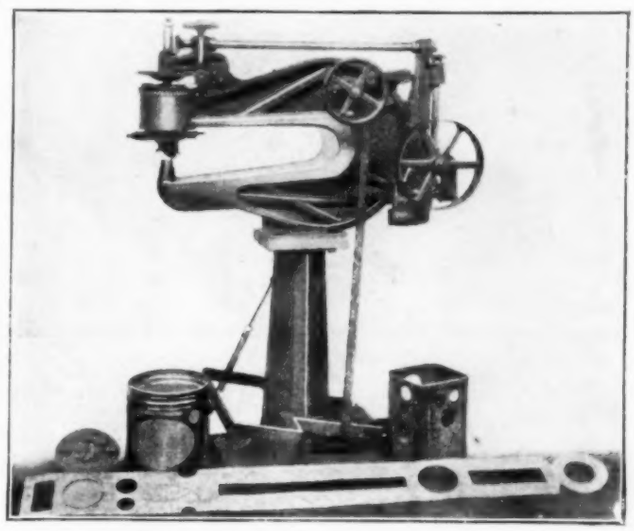
P. M. C. PRECISION BENCH LATHE

Gray's Turret Rotary Shear

A rotary shear that cuts openings of any shape without cutting in from the edge and without turning the sheet, is being introduced by the Southwark Foundry and Machine Co., Philadelphia, Pa., and is illustrated herewith.

This phase of sheet and plate shearing is made possible by a turret, carrying the upper cutter, which while cutting, can be revolved about the lower cutter. The simultaneous driving of both cutters automatically pulls the sheet through the shear. The line to be cut is accurately followed by turning the guide wheel which controls the turret. This operation can be performed from either side of the machine. It cuts openings in widths equal to double the throat depth and without limit on length.

The cutting of circular and oval shapes is done in a continuous operation. In cutting angles the clutch is thrown out by means of the treadle, the upper cutter is moved to a new position on the converging line, the power is thrown in and the new cut is made to the first line. The cutting of zig-zag lines and small radii is made possible by a sensitive clutch controlled by the foot lever. The clutch is engaged by a mechanism that can be stopped and started within ⅛ in. of feel.

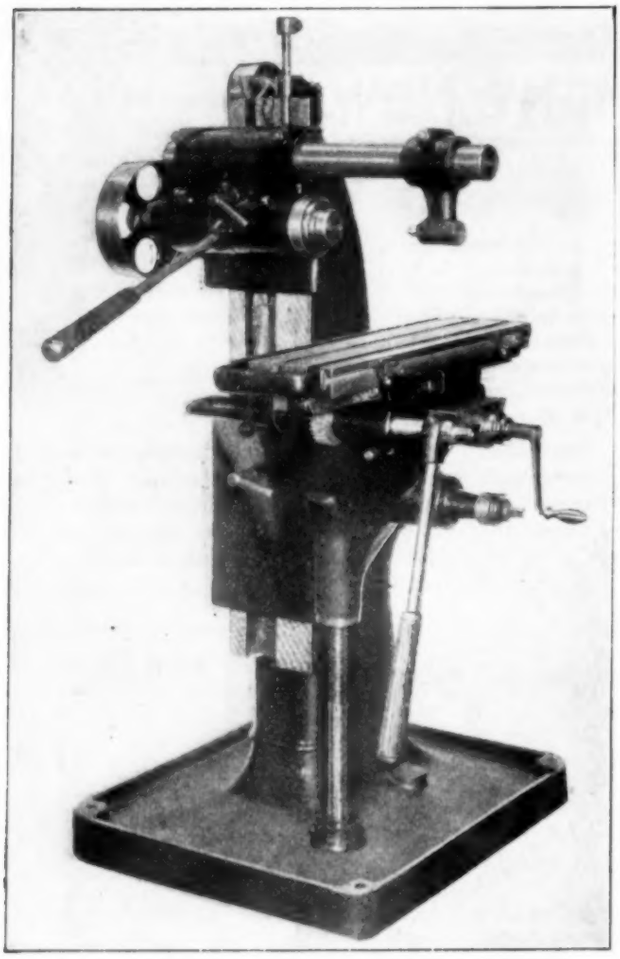


GRAY'S TURRET ROTARY SHEAR

The machine is built in five sizes. The three smaller machines will cut metal of 18, 16 and 10 gage, respectively, while it is stated the two larger sizes will shear plate up to 1 in. thick. The throat depths are from 18 to 36 in.

Superior No. 1 Hand-Milling Machine

The No. 1 hand-milling machine shown in the illustration is being manufactured by the Superior Machine and Engineering Co., Detroit, Mich., and is the design of Richard T. Wingo. This machine is intended for accurate work and is designed for both rigidity of construction and ease of handling. The spindle-slide and knee are fitted to flat guiding ways on the column, the guiding surfaces being long in proportion to their width, so that the slides will move without cramping. The weight of the spindle slide is counterbalanced by means of a spring arrangement inside of the column. The spindle bearings run in bronze boxes which are adjustable for wear.



SUPERIOR NO. 1 HAND-MILLING MACHINE

Specifications: Table, surface, 22 x 4½ in.; T-slots, ⅝ in. wide; longitudinal travel, 6 in.; traverse travel of saddle, 6 in.; vertical travel of knee, 12 in. Spindle, No. 10 B. & S., taper in nose; vertical travel, 4½ in. Overarm, 2¼ in. dia. Distance from center of spindle to underside of arm, 3½ in. Driving pulley, dia., 10 in.; width of face, 3½ in.; speed, 300 r.p.m. Spindle has 12 speeds, from 150 to 600 r.p.m. Speed-change pulleys, 4½, 6¾, 8 and 9 in. dia. for 2¾-in. belt. Floor space, 34 x 41 in. Net weight, 860 lb.

The machine was designed for single-pulley drive direct from the mainline shaft, no countershaft being required. The driving pulley is inclosed in a housing at the back of the machine and is fully protected. Belt drive is employed from the driving-pulley shaft to the spindle, and suitable idler pulleys are provided for tightening purposes. If so desired, the machine may be furnished motor driven, with a 1½-hp. motor mounted on a bracket fastened to the base of the machine.

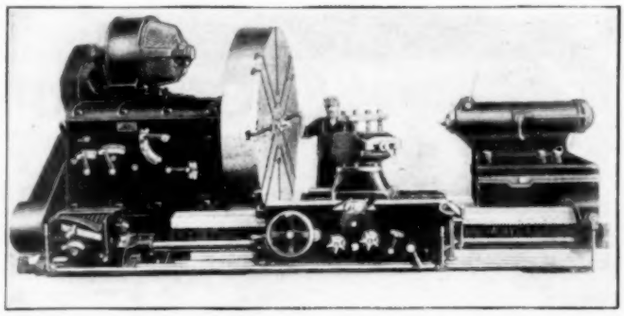
Betts-Bridgeford 60 and 72-in. Lathe

An all-geared-head lathe to swing 60- and 72-in. has been designed by the Betts Machine Co., Rochester, N. Y., and is shown in the illustration herewith.

The headstock is of the all-geared enclosed type, and is driven through an expanding-ring friction clutch operated from the apron. The same movement which disengages the clutch automatically applies a friction brake, thereby stopping the machine almost instantly.

There are twelve spindle speeds in geometric progression, any one of which can be obtained instantly, controlled by conveniently located levers at the front of the headstock.

All speed changes are obtained through hardened-steel sliding gears and positive clutches running in oil. No two speeds can be engaged at the same time. All shafts and gears are located in the lower part of the headstock. All shaft bearings are bronze-bushed and all bearings are lubricated by means of chain oilers. When the machine is motor driven the motor is mounted on top of the headstock cover and connected direct through gearing to main driving shaft.



BETTS-BRIDGEFORD 60- AND 72-IN. LATHE

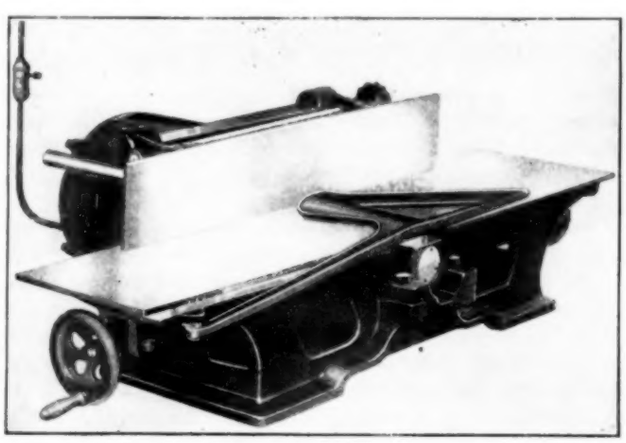
There are thirty-two changes of feed and leads obtainable through quadrant gearing and a quick-change gear box to lead screw.

Feeds and leads are interlocking, so that only one can be in use at one time.

The apron is of the double-wall unit-casting construction, there being no overhanging studs. All shafts have a bearing on each side, the gearing running in oil. Power angular feed to the compound rest is driven from the cross feed friction, a slip gear being provided for the cross feed or power angular feed. Both feeds and leads may be reversed either at the headstock or at the apron. Power rapid traverse is obtained by means of a friction clutch in the quick change box and operated by a lever at the apron. The movement which engages the rapid traverse clutch automatically disengages the feed and lead.

Wallace Bench Jointer

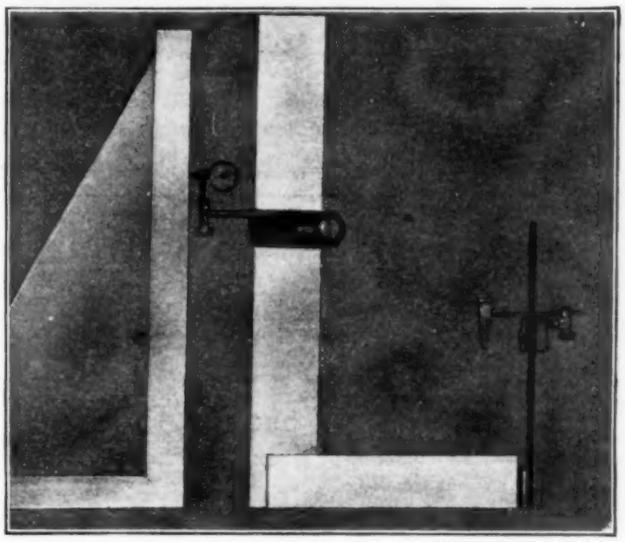
The jointer shown in the accompanying illustration has lately been brought out by J. D. Wallace & Co., 1401-1405 W. Jackson Boulevard, Chicago, Ill. The machine is portable, the idea being to take the machine to the job, rather than the job to the machine. It is equipped with a ½-hp. motor, ball-bearings, safety cutter head, rabbeting ledge, adjustable fence and tables, flap and shutter guard, and can be operated from a lamp circuit.



WALLACE BENCH JOINTER

"Correct" Indicator Holder

The Guldager & Jantch Co., 460½ Lenox Ave., Detroit, Mich., has brought out the indicator holder shown in the illustration. The device is made to fit the blades of



"CORRECT" INDICATOR HOLDER

squares and is adjustable for widths of blades from 2 to 3 in. Steel balls are used for sliding contacts allowing an easy movement up or down the square blade. A thumbscrew at the back is used to lock the holder in any desired location. The indicator is not included with the holder.

A Point in Cost-Finding

By Arthur B. MacAttammany

Many producers and manufacturers in this country today find themselves in the predicament of the commercial concerns in Germany, which, following the signing of the armistice and the re-entry of that country into the commercial arena of the world, sold tens of thousands of tons of material at prices which, according to slipshod calculations, afforded them abnormal profits —their computations being based entirely upon the initial cost of the raw materials that existed before the war. After these Teutons had disposed of a great accumulation of commodities, at quotations which they thought yielded an inordinate profit, they were dismayed to find that two or three times the amount of their receipts would be required to replace their stock of materials for future manufacture.

Costs Should Be Based on Existing Market Values

Manufacturers who adhere to the suicidal policy of basing their selling prices on the actual cost of raw materials as paid in the past, instead of at market values gaged at the time of the actual sale of the finished product, are bound to be much upset when market prices for raw materials go downward. Then such producers have on their hands high-cost raw materials in a declining market, and consumers will certainly not pay these producers on the basis of the actual cost of the materials bought in a high market. It is the market value prevailing at the time of purchase that should be the criterion. Even if the seller pleads that the raw materials which went into his finished product cost him considerably more than raw materials would at the time of sale, the buyer does not feel inclined to pay for the manufacturer's error in judgment, namely, that of purchasing raw materials at the wrong time and therefore at the wrong price.

It is obvious that the only equitable way in which manufacturers of commodities that are made up from raw materials subject to fluctuations, due to the H. C. L. or to speculative influences, can safeguard themselves is by taking advantage of the safe and secure law of averages. If makers of merchandise are fortunate enough to have low-cost raw materials on hand at the present time, they are, in justice to themselves, compelled to consider whatever profits arise out of this fortuitous circumstance as a reserve fund against the day when they will have high-cost raw materials on hand in a market that is tending downward.

Difficulties Arising from Careless Cost Keeping

The trouble here lies in the fact that those who have made a sufficient study of the character of their business and know that the principle herein outlined is fundamental to success and who will, therefore, not deviate from the steadfast adherence to it, are suffering from the competition of those who have never been able to grasp the vital importance of this policy, although they are surely well intentioned in their mercantile methods. Manufacturers in many lines are finding it more and more difficult to meet the ruinous competition of those who do not know how to figure, with a view to both past and present costs, what their products represent in actual value.

Retailers in many lines are often criticized, because, when pursuing price-cutting tactics, or even when operating on a normal price basis, they fail to calculate the cost of rent, clerk hire and lighting in striking a price for their merchandise. Some manufacturers seem to be just as lacking in analytical power. Even in these times of rising prices, entirely too many manufacturers calculate their costs on the actual price paid for raw material in the past. True they do make a profit, calculating on the past, but they are actually losing money when they come to replace their stock of raw materials —that is the point which this article aims to point out. Those who do not recognize it are inviting disaster by their shortsightedness.

The science of cost finding has undergone a complete change since the sharp upward tendencies of raw materials, particularly those subject to speculative influences, or others dependent upon a changing status of supply and demand.

To some trades the example set in maintaining the policy previously outlined by the executive managers of the brass-rolling mills of this country is worthy of emulation. These men adjust their prices speedily, upon any rise or decline in the copper market, for that metal is a basic ingredient of their manufactures. The reserves of copper and zinc which these mills carry are so large that very often the mills work through a prolonged period of high-priced copper on metal which they bought in an abnormally low market. By doing that the guiding executives of the brass mills are enabled to lower their prices consistently when the copper market goes down, in spite of the fact that they may have copper on hand which cost them considerably more than they will receive for their finished product.

SPARKS FROM THE WOR

Valentine Francis

Orville Wright Awarded John Fritz Medal

Speakers Sketch Wright Brothers' Lives from Boyhood Until Their Early Success

The presentation of the John Fritz Medal to Orville Wright, airplane inventor and honorary member of the A. S. M. E., was made in the auditorium of the Engineering Societies Building, 29 West 39th St., New York, on May 7, 1920. Many men prominent in the four big engineering societies attended, among whom were two John Fritz Medal holders—Dr. Elihu Thomson and J. Waldo Smith.

Charles F. Rand acted as chairman in the absence of Benjamin B. Thayer. He opened the meeting telling of the origin of the John Fritz Medal and how the board of award—comprising sixteen men, four from each of the National mechanical, civil, mining and metallurgical, and electrical engineering societies—chooses one man each year to be presented with the medal. He also read the list of former medalists—from 1902 up to the present year—who are as follows:

The first award of the medal was made to John Fritz at a dinner given to him on his eightieth birthday, August 21, 1902; 1905, to Lord Kelvin for his work in cable telegraphy and other scientific attainments; 1906 to George Westinghouse for the invention and development of the air brake; 1907, to Alexander Graham Bell for the invention and introduction of the telephone; 1908, to Thomas Alva Edison for the invention of the duplex and quadruplex telegraph, the phonograph, the development of a commercially practical incandescent lamp, the development of a complete system of electric lighting, including dynamos, regulating devices, underground system protective devices and meters; 1909, to Charles T. Porter for his work in advancing the knowledge of steam engineering and in improvements in engine construction; 1910, to Alfred Noble for notable achievements as a Civil Engineer; 1911, to Sir William H. White for notable achievements in Naval Architecture; 1912, to Robert W. Hunt for his contributions to the early development of the Bessemer process; 1913, no award; 1914, to Professor John E. Sweet for his achievements in machine design and pioneer work in applying sound engineering principles to the construction and development of the high-speed steam engine; 1915, to Dr. James Douglas for notable achievement in mining, metallurgy, education, and industrial welfare; 1916, to Dr. Elihu Thomson for achievement in electrical invention, in electrical engineering and industrial development, and in scientific research; 1917, to Dr. Henry M. Howe for his investigations in metallurgy, especially in the metallography of iron and steel; 1918, to J. Waldo Smith for achievement as engineer in providing the City of New York with a supply of water; 1919, to General George W. Goethals for achievement as builder of the Panama Canal; 1920, to Orville Wright for achievement in the development of the airplane.

Major General George O. Squier, Chief Signal Officer, U. S. A., made an address on the Government's dealings with the Wright brothers in the purchase of the first plane. General Squier was on the Government board at the time—beginning in 1907—and he related many humorous incidents. One of the things the Board insisted on was that there should be no gas bags attached to the plane. The Government specifications were as follows: The plane must stay in the air for one hour; make a speed of 36 miles; hold sufficient fuel to go 125 miles, and carry an extra passenger.

When the test was finally held the Board, ignorant of the art of flying, selected a stretch which was densely wooded and impossible of landing. Luckily, no forced landing was made and the machine met all the specifications. The Wright brothers' final duty in the Government deal was to teach two Army men to fly.

Colonel Edward A. Deeds, formerly a member of the Aircraft Production Board and a close friend of Orville Wright, was the next speaker. In "machine-shop English" as he termed it, he told of the life of the Wright brothers from their boyhood days.

The Wright brothers' first mechanical venture was a printing press which they built themselves and from which a small juvenile newspaper was printed. Later, they experimented with bicycles and built racing bicycles.

They first became interested in the possibility of flying when Bishop Wright, the boys' father, brought home a small flying toy. They experimented with this toy and built some so large that they would not fly. From this toy they switched to kites and thence to gliders. The brothers took their work seriously and studied every known book on wind and aeronautics published at that time. Their first glider was completed in 1900 and instead of soaring into the wind it was blown backward. In fact, they turned it around and made better results by using the rear end forward. Not being satisfied with the results obtained, another glider was built following closely all the printed data and theories they could find. This plane was ready in 1902 and it did not work as well as the first.

Though they had no funds at the time the brothers refused to become discouraged and they went ahead, knowing then that the printed theories were wrong. That year they built the first wind tunnel and made an elaborate study of the effect of wind on surfaces. After considerable experimenting they built a glider which was satisfactory.

With the glider built the problem of its control presented itself. They found that an airplane rudder worked opposite from that of a ship and after other similar experiences, solved the problem of plane control so well that their system remains practically unchanged today. Step by step they forged ahead, and their next problem was to build a motor and propeller. They worked on the propeller with the theory that it was a plane surface moving in a spiral. This, too, presented serious problems. They finally used two propellers turning in opposite directions and being run by chains and sprockets. At first difficulty was experienced with bolts becoming loose; they overcame this by using tire cement spread in the threads of bolts.

The last step was to obtain a motor, and this also, they had to build themselves. Back in their old bicycle shop they designed and built a four-cylinder (the cylinders were not vertical—they were sideways), eight-horsepower engine.

On Dec. 4, 1903, on the side of a hill, Orville, on the first tryout, let the machine get away without being in it, and it crashed.

On Dec. 17, 1903, the machine was repaired and Orville was the first man to fly (it was his turn—the brothers took turns in flights). The flight lasted twelve seconds and he flew through 540 ft. of wind.

From that time on the brothers learned to fly. They crashed again and again in experimenting with tail spins, turns, etc. Truly, the most remarkable thing about their lives was that they lived through their experiments.

Colonel Deeds added that Orville missed a chance of a lifetime when he took the Crown Prince for a flight in Germany and didn't push him off. This was long before the war.

Comfort A. Adams, past president of the American Institute of Electrical Engineers made the presentation speech. He said that the medal was awarded not only to Orville Wright in body but to Wilbur in spirit.

Orville Wright made a short response, giving credit to his predecessors. He said that he appreciated the honor particularly because it came from the four great engineering societies.

Benicia Arsenal Appropriation Urged Before Senate Committee

Improvement of Benicia Arsenal and an appropriation of $2,500,000 to make a great manufacturing Army and Ordnance plant has been vigorously urged by Senator James D. Phelan before the Senate Military Affairs Committee. A bill by Representative Curry for the appropriation has been pending in the House for several years and at every session Pacific Coast Congressmen have advocated the measure. These requests have been refused because the War Department, on recommendation of the General Staff, which claims the arsenal is too close to the sea and therefore liable in time of war to be destroyed or seized by an enemy from the Pacific, has invariably refused to agree to the improvement, despite the recommendation of Colonel E. P. O'Hearn, the commandant.

An effort was made by Mr. Curry at this session to secure the appropriation in the House Army bill but the House Military Affairs Committee refused to include the appropriation in the measure.

Senator Phelan presented to the Senate Committee an elaborate argument for the big appropriation in an effort to refute the War Department claims.

Rail Head Takes Action Against Compulsory Metric Laws

B. A. Worthington, president of the Cincinnati, Indianapolis & Western, is sending a letter to railroad men opposing compulsory metric system legislation.

United States Civil Service Examination Ordnance Research Engineer

The United States Civil Service Commission announces an open competitive examination on June 22, 1920, for ordnance research engineer. A vacancy at the Frankford Arsenal, Philadelphia, Pa., and vacancies in positions requiring similar qualifications, in the Ordnance Department at large, or other branches of the service, at $4,000 to $5,000 a year, or higher or lower salaries, will be filled from this examination, unless it is found in the interest of the service to fill any vacancy by reinstatement, transfer, or promotion.

The entrance salary within the range stated will depend upon the qualifications of the appointee as shown in the examination, and the duty to which assigned.

All citizens of the United States who meet the requirements, both men and women, may enter this examination; appointing officers, however have the legal right to specify the sex desired in requesting certification of eligibles.

The duties of this position require the services of a highly trained engineer with considerable experience in machine and forge shop and metal-manufacturing methods and especially the working of the copper alloys. His services will be used in the design and development of experimental ammunition such as fuses, shell and other components of artillery ammunition.

A knowledge of interior ballistics is very desirable.

Competitors will not be required to report for examination at any place but will be rated on the following subjects which will have the relative weights indicated on a scale of 100: (1) Education and training 25; (2) Preliminary and responsible experience 75.

Competitors will be rated upon the sworn statements in their applications and upon corroborative evidence.

Applicants must have graduated in mechanical or electrical engineering from a college or university of recognized standing; and have had (a) at least five years' practical experience in the design or manufacture of metal products especially the copper alloys, of which not less than one year was in a responsible position with a manufacturing concern making artillery ammunition, or (b) three years' experience in a position of responsibility in the design and development of experimental ammunition, with a manufacturing concern.

Applicants will be admitted to this examination regardless of their age; but at the request of a department making appointment certification will be made of eligibles who are within reasonable age limits, except in the case of persons entitled to preference because of military or naval service, to whom age limits do not apply.

Applicants must submit with their applications their unmounted photographs, taken within two years, with their names written thereon. Proofs or group photographs will not be accepted.

Photographs will not be returned to applicants.

Applicants should at once apply for Form 1312 (stating the title of the examination desired) to the Civil Service Commission, Washington, D. C.; the Secretary of the United States Civil Service Board, Customhouse, Boston, Mass., New York, N. Y., New Orleans, La., Honolulu, or Hawaii; Post Office, Philadelphia, Pa., Atlanta, Ga., Cincinnati, Ohio, Chicago, Ill., St. Paul, Minn., Seattle, Wash., San Francisco, Cal.; Old Customhouse, St. Louis, Mo.; Administration Building, Balboa Heights, Canal Zone, or to the Chairman of the Porto Rican Civil Service Commission, San Juan, P. R.

Applications should be properly executed, excluding the medical and county officers certificates, and must be filed with the Civil Service Commission, Washington, D. C., prior to the hour of closing business on June 22, 1920.

Reiley Heads Davis-Bournonville Co.

DeWitt V. D. Reiley, formerly vice president of the Davis-Bournonville Co. of Jersey City, N. J., was elected president of that company at a recent meeting of the directors. Mr. Reiley succeeds Augustine Davis, who resigned last November. Charles B. Wortham, treasurer of the company since its organization, was elected vice president, and William G. McCune secretary and treasurer.

The directors are DeWitt V. D. Reiley, Charles B. Wortham, William G. McCune, Augustine Davis, Charles J. Mayer, Daniel E. Evarts and H. Rowntree.

LD'S INDUSTRIAL FORGE
News Editor

Republic of Poland to Campaign $50,000,000 Loan in U. S.

The campaign to sell the $50,000,000 loan of the Republic of Poland in the United States has been endorsed by the directors of the American-Polish Chamber of Commerce and Industry in the United States, of which Francois de St. Phalle, vice president of the Baldwin Locomotive Works, is president. The entire proceeds of this loan will be expended in the United States for raw material and merchandise necessary to aid in rehabilitating the Polish Republic. The resolution follows:

Whereas, the American-Polish Chamber of Commerce and Industry has been formed to promote trade between the United States of America and Poland, and

Whereas, under present circumstances, it is extremely difficult for purchasers in Poland to establish credits in the United States and in order to permit the establishment of such credits, the Polish government is now taking steps to float in the United States a loan of $50,000,000 to be applied as a first installment for settlement of purchases in the United States of raw materials and machinery amounting to over $250,000,000 during the next year, and

Whereas, it is greatly to the interest of Poland and the United States that such purchases take place and the exchange of commodities be created, and

Whereas, the Republic of Poland has obtained stability and succesful government insuring full protection for the loan contemplated; therefore, be it

Resolved, that the American-Polish Chamber of Commerce and Industry desires in every way to facilitate the success of said loan and calls the attention of American manufacturers, merchants and bankers to the advisability on their part of giving full co-operation in order to attain success.

The steady successes of the Polish armies in their repulse of the Russian Bolshevists mean a peace in the near future according to American foreign-trade authorities. When war ceases, Poland can devote its entire attention to restoring the country to its former agricultural and manufacturing importance. American merchants are arranging to exchange raw materials for the finished textile products of the factories at Lodz and other manufacturing centers, and American companies are active in developing the Galacian oil fields, the second largest in Europe, being surpassed only by Russia.

Proposed Anglo-American Standards for Rolled-Steel Shapes

It may not be generally realized that approximately 75 per cent of the world's demand for steel is specified to either American or British standards, but unfortunately the standards in vogue in these two countries and their dependencies have hitherto varied to such an extent as to introduce annoying difficulties in the way of interchangeability. The rolled-steel shapes used in building structure, bridges, railroad cars, and ships are notable in their points of difference, for not only do their contours and ranges vary, but a different language is used in dimensioning their thicknesses. While some steps were taken during the great war looking to the adoption of international standards for shapes used in shipbuilding, these were primarily of an emergency nature and did not attempt to cover other branches of industry.

During the year 1919 the British Engineering Standards Association undertook the revision of its standards for rolled-steel shapes, and following a visit of its secretary to this country it sent a formal invitation to the American Engineering Standards Committee to co-operate in the possible adoption of Anglo-American Standards for these shapes. Under the auspices of the American body the following organizations were requested to confer on the proposed standardization: United States Navy, Association of American Steel Manufacturers, American Bureau of Shipping, American Society of Civil Engineers, American Railroad Association, Society of Naval Architects and Marine Engineers and the Railway Car Manufacturers' Association.

All of these organizations accepted the invitation with the exception of the American Railroad Association which is not able to act at this time but may do so later on. The Canadian Engineering Standards Association has also been invited to co-operate, but has so far not been able to do so actively. A number of conferences have been held and on April 27 the committee formulated a complete preliminary report for transmission to the British Engineering Standards Association as a basis for discussion on common Anglo-American standards.

The representatives of the various organizations are known as the "Sectional Committee on Steel Shapes" of the joint sponsor bodies—the American Society of Civil Engineers, the Association of American Steel Manufacturers, and the Society of Naval Architects and Marine Engineers—and they are very anxious to get a full and free discusion of the whole subject by anyone interested.

Criticisms or suggestions will be cordially welcomed by the committee. Communications should be addressed to Dr. P. G. Agnew, secretary, American Engineering Standards Committee, No. 29 West 39 St., New York City.

March Exports of Metal-Working Machinery

Exports of metal-working machinery during March, 1920, and the revised figures for March, 1919, as compiled by the Bureau of Foreign and Domestic Commerce, are as follows:

	March, 1919 Value	March, 1920 Value
Metal-working machinery:		
Lathes	$1,012,847	$1,079,793
Other machine tools	870,663	1,943,230
Sharpening and grinding machines	485,959	475,248
All others	2,646,295	1,652,604
Total metal-working machinery	$5,015,764	$5,150,875

There were only twelve machine tools imported during March. These were valued at $7,741.

Philadelphia Foundrymen's Association Meeting

At the two hundred and ninety-seventh meeting of the Philadelphia Foundrymen's Association, held at the Manufacturers' Club, Philadelphia, May 12, Thorsten Y. Olsen, of the Tinius Olsen Testing Machine Co., gave a lantern-slide talk on the "Recent Developments of the Testing Machine and the Testing of Material as Related to the Foundry." The illustrations covered plain and autographic machines for tension, compression, endurance, fatigue, bending, etc., including a machine for testing the cutting properties of cutting tools and cutting compounds. The Matsumura Repeated-Impact Testing Machine, the first testing machine of Japanese design to be introduced into this country, was described.

Wm. H. G. Walker of the H. G. Trout Co., Buffalo, talked on foundry conditions in Buffalo.

Franklin Institute Awards Medals

The Franklin Institute of Pennsylvania, Philadelphia, held its stated meeting on May 19, 1920, at 4 p.m. Two Franklin Medals were awarded. One was presented to Sir Auckland Geddes, British Ambassador, for the Honorable Sir Charles A. Parsons, Newcastle-on-Tyne, England. The other was presented to W. A. F. Ekengren, Minister of Sweden, for Professor Svante August Arrhenius, Nobel Institute, Stockholm, Sweden.

Papers read were: "Some Reminiscences of Early Days of Turbine Development," Sir Charles A. Parsons, K.C.B., C.B., M.A., LL.D., D.Sc., F.R.S., and read by Charles Day of the Institute; "The World's Energy Supply," by Prof. Svante August Arrhenius, Ph.D., M.D., D.Sc., LL.D., and read by Allerton S. Cushman, Ph.D., also of the Institute.

T. C. Allen Now With The Penn Seaboard Steel Corporation

T. C. Allen, formerly comptroller of the Tacony Steel Co., has been appointed assistant to the president of the Penn Seaboard Steel Corporation.

Mr. Allen was one of the early members of the Tacony organization, which he joined as comptroller of the Tacony Ordnance Corporation on January 1, 1918. Previous to his coming to Tacony he had been for two years assistant comptroller of the Remington Arms Co., of Delaware. He had also been auditor of the Maryland Coal and Coke Co. for five years prior to that.

When the Tacony Ordnance Corporation consolidated with the Tacony Steel Co., Mr. Allen became comptroller of the consolidated organization with full supervision of all general and cost accounting.

Industrial Review of Great Britain

Situation in Scotland Continues Good—Shortage of Raw Material in Birmingham Acute

GLASGOW

The industrial situation in Scotland continues pretty good. The employment of disabled men on a percentage basis under the National Seal of Honor scheme has now been undertaken by 940 Scottish firms, and under the interrupted apprenticeships training scheme the total number of agreements concluded is over 9,000. The Clyde Valley Electrical Power Co. has just put to work at Yoker the largest generating set at present in operation in Scotland, the output being 25,000 hp. on continuous rating. It is expected that the steam consumption on full load will not exceed 11½ lb. per kw.-hr. Electric power supply conditions in the Yoker area compare favorably with those elsewhere in Britain. All the engineering works at Linwood, and nearly all those in Johnstone, now derive their motive power from this station, at rates making the retention of former steam and gas plants out of the question, except as emergency standbys.

Scotch shipbuilding returns for March were disappointing, the output for the first quarter of the year, though showing some improvement over the same period of last year, falling considerably behind many first quarters in prewar years. Shortage of plates, and other material, has probably had much to do with the low output. In all, sixteen vessels of rather less than 29,000 tons were launched, the Clyde contributing eight vessels of a little over 25,000 tons. Repair and overhaul work continues very plentiful and makers of large internal combustion propelling plants are increasingly busy. Campbell & Calderwood, Ltd., Paisley, has been formed with a capital of £50,000 to carry on as engineers and shipbuilders.

Danger of a stoppage in the coal industry appears to be averted and the output from Scotch mines has recently shown improvement. Very busy conditions are the rule in all branches of the iron and steel industry. The demand for pig iron exceeds the supply, foundry qualities being particularly scarce at present. Hematite was advanced by 10s. a ton at the beginning of the month. Workmen in the bar iron industry have had their wages advanced 17½ per cent on basis rates, owing to the average net selling price of bars having been over £24 a ton.

Iron founders have far more work than they can overtake, and have various difficulties to hinder output. It is reported that castings of the better sort, such as are required for internal combustion engines, are now being ordered in Holland to a considerable extent. The Scottish Aluminum Co., Ltd., Govan, has been formed with a capital of £25,000.

In spite of continued government sales of tools and general engineering plant, Scotch machine-tool makers almost without exception keep well engaged, with solid inquiries and good orders coming steadily to hand. W. D. McKendrick & Co., Motherwell is doing good business with its four-speed radial drills with spindle speeds of 180 to 500 r.p.m., and feeds of 3 to 6 in. per minute, with the spindle at the highest speed.

At Govan the Shafting Co. is sharing in the general activity and G. & A. Harvey, Ltd., is fully engaged on 18-in. all-gear lathes and boring and facing machines up to 6 ft., with a special run just now on the 3 ft. size. They are also putting through several 16-in. center locomotive axle lathes to take work 9 ft. 6 in. long, and have just completed several surface tables measuring 15 ft. to 18 ft. by 7 ft., all for local firms. Ready for shipment to Japan is a 5-ft. boring and facing machine driven by a variable-speed 15-hp. motor. A larger machine, arranged for turbine boring, has a bed 29 ft. long and a front table 60 ft. long, and is provided with a boring bar, 16 in. in diameter by 58 ft. long, fitted with facing arms and spiders, etc. This machine is driven by a 40-hp. variable-speed motor and weighs all complete rather more than 100 tons.

BIRMINGHAM

The position in regard to raw material is becoming increasingly anxious. A shortage which was partly disguised during the dislocation caused by the molders' strike has suddenly become much more apparent. All the industries which depend on iron and steel are involved in varying degrees, and under pressure of the competition for supplies the upward movement of prices continues almost uninterruptedly. Officially declared rates very soon cease to have

any relation to actual selling values, because for anything that comes on the market harassed consumers, at their wits' ends for the means of keeping plants running and fulfilling their engagements, are willing to pay substantial premiums if only they can get deliveries. There are few manufacturers who can get the production at which they aim with the raw material assigned to them under their regular contracts.

As for specifications which are out of the ordinary routine, or which do not yield the maximum profit with the minimum of labor, they simply are not considered or if accepted they are deferred indefinitely in favor of more attractive work. "Production program is dictated by labor now," the writer was told in reference to the steel rolling mills; very much the same applies in other departments. When the eight-hour day came in the available labor only sufficed to operate about two-thirds of the plants and it was concentrated on those which afforded the best return. The automobile makers are now complaining that they are not getting more than half the tonnage they require of light plates for chassis construction while heavy material is being supplied to the shipbuilding yards faster than it can be used. So serious has the position become that the automobile trade has taken its grievance to the Board of Trade, whose intercession has brought about some slight improvement, but not enough.

At present there is little promise of escape from this dearth of raw material. The make of pig iron is nothing like what it ought to be, owing to continued shortage of fuel. One or two additional furnaces are being lighted in the Northamptonshire district. On the other hand, two Black Country furnaces are being dismantled. Those in blast are only a comparatively small proportion on the whole and they have frequently had to be damped down or to go on slack blast because coke was not available. The position as regards transport is better than it was without being satisfactory.

Work is proceeding fairly regularly in most of the engineering branches. The question of negotiations on payment by results, on which a number of the trade unions are now balloting, excites only a tepid interest. On no occasion when a declaration has been challenged in the past has an aggregate vote been cast in favor of the system. Yet, in actual practice, it has almost displaced time rates in this district. It is stated that in Coventry 90 per cent of the whole of labor is employed on piece work rates. In the Birmingham district the general average is not quite so high, though some of the big firms apply payment by results to 95 per cent of their operatives.

The equipment of the Brolt factory at Oldbury is now complete and the firm has begun to turn out its specialties in automobile lighting and starting sets on mass production principles. In this enterprise the Brolt Co. and the G. H. Alexander Engineering Co. have joined forces. The Oldbury site has an area of six acres and the present factory floor space covers 45,200 sq.ft. The immediate program approximates to 1,000 sets per week.

An International Trade Fair organized by the town council is to be held in Cologne on Sept. 20 next, and thereafter in the spring and autumn of each year, the purpose being to encourage the import of raw material into Germany from overseas. Masson Seeley & Co., Ltd., 121, Victoria St., London, S. W., is dealing with the matter in Great Britain.

The Fair opened in Brussels on April 4 is, a correspondent informs us, a real success, attracting a considerable number of visitors. We understand that some 50 or 60 British firms are showing and that machine tools are included. Henri Benedictus, Brussels, for example, is displaying a number of American tools, including Norton, Le Blond, Pratt & Whitney, Allen and other productions, and has a stand of about 1,200 sq.ft. The Fair is being held in a central position, in the Park of Brussels.

Resolutions Against Metric System

By the Society of Naval Architects and Marine Engineers

WHEREAS, A bill for the adoption of the metric system in the departments of the Federal Government has been favorably reported to the House of Representatives;

WHEREAS, We consider that the only effect of such a law will be the creation of a government metric system and the continuation of the existing system in ordinary trade and industry;

WHEREAS, The confusion resulting from such a condition of things would be intolerable;

WHEREAS, We believe the adoption of the metric system of weights and measures by the people at large to be impracticable, therefore be it

RESOLVED, By the Society of Naval Architects and Marine Engineers assembled in annual meeting, that we condemn all legislation intended to promote the adoption of the metric system in this country

By the American Gear Manufacturers' Association

RESOLVED, That the American Gear Manufacturers' Association in convention assembled, hereby declare themselves as opposed to any change in our present system of measurement.

RESOLVED, That a copy of this resolution be forwarded to The World Trade Club, Woodrow Wilson, President of the United States of America, British Premier, the Right Honorable David Lloyd George, and the American Institute of Weights and Measures

Trade Currents from New York and Chicago

NEW YORK LETTER

While there were more inquiries out this week for machine tools, business in this section is reported to be slower than in the New England states. The inquiries indicate however, that more large industrial plants will soon be in the market for additional shop equipment. There remains a steady demand for all types of presses and a good market for turret lathes and milling machines.

The time of delivery is emphasized in current inquiries. Small machines can be promised in three or four weeks, while orders for many of the heavier types of tools are accepted for delivery next Fall.

The export demand remains the same as last week for machine tools, although many inquiries are being received from Russia and the Scandinavian countries. The inquiries from Russia are for equipment to be used in various construction work, while those from other countries embrace the entire list of machine tools.

The Lord Construction Co. has a list out for thirty-four machine tools, including lathes, grinding and milling machines, boring mills, punches and drills. The machines will be used in the construction of a shipyard at West New York, N. J.

The General Electric Co. is also in the market for equipment for its plant in Baltimore. Several lathes, etc. for the Bridgeport, Conn. factory were purchased this week. This company will later be in the market for new machine-tool equipment for the plant at Ft. Wayne, Ind.

The Mitsubishi Co., of 120 Broadway, is asking for catalogs and quotations on machine tools for a shipyard in Japan. No orders will be placed until the requirements are definitely determined.

George W. Goethals, Inc., of 40 Wall St., placed its last order this week for machine tools for the Automatic Straight Airbrake Co. Several turret lathes were bought by the S. S. White Dental Co., of Long Island City and by the Axel Co., of Pottstown, Pa.

The New York, New Haven & Hartford R. R. has been buying journal lathes, and it is reported that the Long Island R. R. has a small list in preparation.

CHICAGO LETTER

Chicago business in actual orders placed continues fairly steady, at a rate approximately 30 per cent less than during the first three months of this year. With the exception of the automobile industry, which has virtually disappeared as a buying power, there has been no decided slump in any particular line, the letdown in business seeming to be effective in about the same proportion in all lines of industry to which the machine-tool dealer looks for business. This uniform reduction is taken by some to indicate a more healthy state of business. Its effect has been to cause dealers to strengthen their selling department. For the first time in many months salesmen are now preparing to cover their territories with a view to soliciting orders.

The transportation situation in Chicago continues about the same as was reported last week. Conditions are improving, but very gradually. Chief difficulty still lies in getting direct shipments through from the factory to the customer, with less trouble being experienced in securing goods for Chicago stock or in making shipments from Chicago stock. The railroad strike, as a labor problem, seems to have disappeared, and it is now merely a question of time before the roads get back to a normal basis.

The strike among machinists in Cincinnati continues. The different concerns interested, however, seem very optimistic, the impression being that the current week will see the end of the strike or a resumption of operation regardless of the strike. The demands of the striking workmen are said to cover the 44-hour week, 8-hour day, time-and-a-half for overtime or time-and-a-half for all time put in after 4 p. m., the closed shop and a voice in the management of the shop. As these demands are wholly impossible of fulfillment by the manufacturers and as it is felt that the workers cannot stay out much longer on account of the present high cost of living, a speedy end of the difficulty is anticipated.

The tendency toward steady and even higher prices continues. On May 1 a 10 per cent advance was made on one general line of drills. Collections are reported not quite so satisfactory as heretofore. The situation in this connection is not such as to cause more than passing interest, and it is felt to be largely the outgrowth of delayed shipments.

Employees of the Cincinnati Milling Machine Co. Vote Against Strike

An anti-strike organization was formed by the employees of the Cincinnati Milling Machine Co. consisting of a committee of sixty-eight men. This committee called a meeting of all the shop employees of the company on Thursday afternoon, April 29, to arrange for a secret ballot to be taken by the employees to indicate how many were in favor of striking and how many were opposed to striking.

At this meeting the committee of sixty-eight read the following resolution, same having been unanimously adopted by that committee at a previous meeting. The resolution read as follows:

"*Whereas*, The employees of the Cincinnati Milling Machine Co. have formed a committee of sixty-eight to deal with the impending strike situation, and

"*Whereas*, This committee believes that the Cincinnati Milling Machine Co. has been fair and square in all its dealings with its employees at all times, and

"*Whereas*, The Cincinnati *News*, the official organ of the machinists' union, has in its issue of April 28, made claim that Fred Geier has stood against the progress of the city, that he prevented the policemen, the firemen, and the teachers from securing their increase in pay, and

"*Whereas*, The official records of the Board of Education and the Mayor's office show facts to the contrary, and

"*Whereas*, This situation has resolved itself into a question of following the leadership of a man who has done a great deal for our community, and especially his employees, or following the leadership of a man who, to our knowledge, has done nothing for the betterment of this community, therefore be it

"*Resolved*, That this committee, after careful consideration and debate, believes itself in honor bound to stand by the Cincinnati Milling Machine Co. in the impending emergency."

This same resolution had been adopted and signed by the anti-strike committee of the night force, consisting of thirty men.

The result of the strike ballot of the entire day and night forces of the company resulted as follows:

Opposed to strike	912
In favor of strike	142
Total number voting	1,054

Percentage of total opposed to strike, 86½ per cent.

The Carborundum Co. Acquires New Plants

The Carborundum Co., of Niagara Falls, N. Y., has acquired from the Alien Property Custodian the plant formerly owned and operated by the Didier-March Co. at Perth Amboy, N. J. The plant will be taken over at once and converted to the manufacture of a complete line of Carborundum refractories.

The principal business of the Didier-March Co. was the manufacture of special refractory clay products and practically all of its equipment is well adapted for the processes of the manufacture of Carborundum refractories.

The plant is located on a site of twenty-four acres facing the Raritan River near Perth Amboy, and is well provided with wharfing facilities and railroad connections. It consists of a modern clay working and refractory plant with a capacity of over 100 tons per day and covers a floor space of about 300,000 sq.ft. The buildings are of substantial brick, steel and concrete construction, and there is also included office buildings, laboratories and ample housing facilities for employees.

In addition to this property, the Carborundum Co. acquired sixty acres of high-grade fire-clay lands and a clay excavating plant in operation at Bonhamton.

Advance Furnace and Engineering Co. Organized

The Advance Furnace and Engineering Co., of Springfield, Mass., has been organized and capitalized at $200,000 to manufacture and sell gas and oil-fired metallurgical furnaces, gas burners, oil burners, gas-burning and oil-burning systems, tanks, pumps, blowers and compressors and all accessories. It has purchased a factory on Warehouse St. which will be immediately remodeled and enlarged. About 75 skilled mechanics will be employed.

Wm. F. Scully who for ten years has been with the Gilbert & Barker Manufacturing Co. the last five years as manager of the furnace department is president of the new company. The secretary and treasurer is J. H. Keegan, for the past eight years with the Gilbert & Barker Manufacturing Co., and more recently the assistant manager of sales and engineering. W. A. Buechner is vice president. He has been connected with the Gilbert & Barker Manufacturing Co., and also represents the E. F. Houghton & Co., of Philadelphia, Pa. The chief engineer is H. A. Kunitz, who for the past year was chief engineer of the furnace department of the Gilbert & Barker Manufacturing Co. J. Frank Scully is assistant secretary and treasurer.

DOMESTIC EXPORTS OF METAL-WORKING MACHINERY FROM THE UNITED STATES BY COUNTRIES DURING MARCH, 1920

Countries	491 Lathes	492 Other Machine Tools	493 Sharpening and Grinding Machines	495 All Other
Austria		$907		
Azores and Madeira Islands	$978			$1,237
Belgium	63,895	62,385	$21,143	61,838
Bulgaria		334		
Denmark	2,373	22,067	821	7,243
Finland		14,110	1,197	4,006
France	155,343	435,864	71,886	394,449
Greece	1,000	1,812	186	
Iceland and Faroe Islands	1,650			
Italy	3,971	152,001	8,861	75,216
Netherlands		14,834	854	21,077
Norway	921	7,039	980	125
Poland and Danzig	5,041	4,265	344	
Portugal	6,736	10,451	3,355	2,364
Roumania		416		
Russia in Europe	4,333	600	450	
Spain	99,422	61,759	6,388	68,473
Sweden	11,560	6,640	12,299	17,961
Switzerland	2,237	4,534	120	15,798
Turkey in Europe		232		
England	386,645	299,120	172,980	294,218
Scotland		4,938	10,113	23,156
Ireland	118	681		48,555
Canada	103,811	231,598	48,813	174,499
Costa Rica	85	311		
Guatemala	822	245		254
Honduras	6,300	88		
Nicaragua			100	
Panama	22	331	14	17,875
Salvador		38	143	119
Mexico	14,300	33,300	21,055	17,922
Newfoundland and Labrador		28		571
Jamaica		99		2,468
Trinidad and Tobago	23	2,532	68	
Other British West Indies	235			40
Cuba	29,588	74,264	3,553	15,126
Virgin Islands of U. S		10		
French West Indies		145		168
Haiti		163	45	
Dominican Republic		1,102	53	765
Argentina	8,255	40,837	2,532	7,187
Brazil	22,618	27,495	1,915	13,230
Chile	1 063	6,603	2,833	59,253
Colombia	7,364	1,900	507	780
Ecuador	1,180	1,714	207	2,211
British Guiana		1,941	170	1,347
Dutch Guiana		168		
Paraguay		7,646		
Peru	9,237	5,460	186	915
Uruguay	22	1,282	182	2,206
Venezuela		287	12	145
China	10,228	21,795	1,748	12,571
Kwantung		203		406
Chosen		4,197		
British India	6,663	94,018	4,189	11,831
Straits Settlements		3,818		
Other British East Indies		632		
Dutch East Indies	11,979	5,451	1,576	27,489
Hongkong	2,200	403	19	2,275
Japan	57,869	161,961	60,714	217,108
Russia in Asia			50	
Siam		130		
Turkey in Asia			45	
Australia	8,281	61,129	8,957	12,277
New Zealand	2,314	7,388	2,078	588
Philippine Islands	10,164	7,239	85	3,554
Belgian Kongo				1,736
British West Africa	625			2,875
British South Africa	18,322	21,488	1,374	5,617
British East Africa		426	48	
French Africa		35		
Morocco		21		1,317
Portuguese Africa		5,571		
Egypt		2,749		108
Total	1,079,793	1,943,230	475,248	1,652,604

Ordnance Salvage Board Auction Sale

The Baltimore Ordnance Salvage Board will hold an auction at the Bartlett-Hayward Park Plant, Columbia Ave. and B. & O. R.R., Baltimore, Md., Friday, May 28, beginning at 10 a.m., at which time all the machinery, equipment and materials at this plant will be sold. M. Fox & Sons Co., auctioneers, 20 South Paca St., will conduct the auction.

Leffingwell Speaks on Economic Evils

A terrific arraignment of the reaction and waste which have seized on the American people as a cause for the present economic evils now threatening the nation was made recently by R. C. Leffingwell, assistant secretary of the Treasury in an address before the Academy of Political Science at New York. Liberty Bonds and Victory Notes, he declared were never meant to be used as spending money and their misuse in that way is the primary reason for the fall in price of those securities.

"Since Armistice day," he said, "the world has not only failed to make progress toward the restoration of healthy economic life but in fact has receded further from a sound position. We have failed to restore peace and peace conditions in Europe and in America, unsound economic ideas have in many instances prevailed and the effort is being made first here and then there to improve the condition of some of the people at the expense of all of the people.

"At this most critical moment in the history of Europe—when our own financial and economic stake in Europe's affairs is so great that disaster there could only mean disaster here—many or our own people have turned gamblers and wasters. For plain living and high thinking, we have substituted wasting and bickering. We enjoy high living while we grumble at the high cost of living—of silk stockings and shirts for the poor, of automobiles for men of small means, and of palaces for the profiteer and the plutocrat."

Regarding the depreciation of the market price of Liberty Bonds and Victory Notes, Mr. Leffingwell said, "In the history of finance, no device was ever evolved so effective for procuring saving as the Liberty Loan campaigns. A year ago, it was freely predicted by financial authorities that Victory Notes would shortly go to a premium and that Liberty Bonds would be selling at or near par within a year of two.

"Every one knows why these sanguine expectations have not been realized. With the armistice and still more after the Victory Loan, our people underwent a great reaction. Those who bought Liberty Bonds as a matter of patriotism but not as investors, began to treat their bonds as so much spending money. Those who had obeyed the injunction to borrow and buy Liberty Bonds ignored the complementary injunction to save and pay for them. A $50 bond in the hands of a patriot turned spendthrift was to him a $50 bill to be spent Saturday night, or to her a new hat, and if the $50 turned out to be $45 bill—small matter. This was the first and most immediate cause of the depreciation of Liberty Bonds."

Mr. Leffingwell declared that inflation since the armistice is attributable to world inflation and the internationalization of prices, heavy expenditures by our Government and reaction and waste among the people.

"Our own prices are being inflated," he continued, "and our own banking and currency position expanded by feverish speculation in European currencies, credits and securities. The Government of the United States has been slow to realize upon its salvageable war assets and to cut down expenditures.

"Instead of telling the people frankly and boldly that prices are high because they are wasting, we fix prices and prosecute profiteers in order that the people may buy more and pay less. Instead of telling the people that Liberty Bonds have depreciated because they are treating their bonds as spending money, we clamor that the rate of interest upon the bonds is too low and urge a bonus to bondholders disguised as a refunding operation.

"We must get together, stop bickering and face the critical situation which confronts the world as we should a foreign war. We must cut our Government expenditures to the quick, adjure bonuses and realize promptly on all salable war assets, applying the proceeds to the war debt. We must have a national budget with teeth in it.

"And above all we must work and save. We must produce more, but more important still, we must consume less.

"It might be added that it is not enough to save unless those savings are safely and profitably invested and it is for this reason that the Treasury Department has adopted the issue of savings securities, War Savings Stamps and Treasury Savings Certificates, as a permanent policy."

A dispatch from Montreal reports that shareholders of the Dominion Bridge Co., at a special meeting, unanimously approved the plans of the directors to form the Dominion Engineering Works, Ltd., for the purpose of taking over the present bridge subsidiary, the Dominion Engineering & Machinery Co., Ltd. The present subsidiary is engaged chiefly in the manufacture of paper-making machinery for which extensive contracts are under way.

Personals

H. H. Edge is severing his connections with the Locomobile Co., of Bridgeport, Conn., having been in its employ for nine years, four as factory superintendent and five as general works manager.

H. W. Fielden, auditor of the Penn Seaboard Steel Corporation, has been appointed comptroller of the Tacony Steel Co., Philadelphia, Pa.

C. F. Jemison, treasurer of the Penn Seaboard Steel Corporation has been elected treasurer of the Tacony Steel Co., Philadelphia, Pa.

C. J. Steen, chief engineer of the Tacony Steel Co. has been appointed chief engineer of the Penn Seaboard Steel Corporation, Philadelphia, Pa. He will have supervision of all engineering and designing of the Penn Seaboard and Tacony plants.

Harry A. Hey has been appointed manager of sales in the Eastern territory for the Illinois Tool Works, of Chicago, manufacturer of milling cutters, hobs and reamers. His headquarters will be in New York. Mr. Hey was formerly connected with the Singer Manufacturing Co., and is a member of the A. S. M. E.

Charles H. Brennan has been appointed sales manager of the Jefferson Forge Products Co., Detroit, Mich.

John St. George, of the Bristol, Conn., plant of the New Departure Manufacturing Co., has been selected as production supervisor of the new plant "D" of the company, now being finished at Meriden, Conn. Mr. St. George was formerly production manager in the Meriden branch of the Colt Co., of Hartford, Conn., and has also been with the New England Westinghouse Co.

F. A. Calhoun, formerly sales engineer for Tate-Jones & Co., Inc., in the New York District, has resigned to accept a position as Eastern representative in the New England and Middle Atlantic states for the Standard Fuel Engineering Co., Detroit, Mich., for its line of heat-treating furnaces. Offices are located in the Lincoln Trust Co. Building, 76 Montgomery St., Jersey City, N. J.

Obituary

John Wesley Hyatt, inventor of the Hyatt roller bearing, died on May 10 of heart disease. Death occurred at his residence, Windermere Terrace, Short Hills, N. J. He was eighty-three years old, and was born at Starkey, N. Y.

Emil Stephany, for many years secretary and treasurer of the F. Wesel Co., manufacturer of printing machinery, died at his home 1095 Prospect Pl., Brooklyn, N. Y. He was sixty-seven years of age. He had been a resident of Brooklyn for more than twenty-five years and was well known in engineering circles. He was a member of the Manufacturers' Association and also of the Machinery Club.

William Oesterlein, President of the Oesterlein Machine Co., Cincinnati, Ohio, died at his home on May 10th. (Obituary notice will be published in the next issue.)

Samuel Harris, president of Samuel Harris & Co., manufacturer of machinists' tools and supplies, died recently at his home in Chicago. Mr. Harris was a Civil War veteran and escaped a death sentence at Libby prison by the intervention of Winnie Davis, the confederate president's daughter.

New Publications

Technical Writing. By T. A. Rickard, Editor of the *Mining and Scientific Press*. San Francisco. 174, 5 x 8 pages. Published by John Wiley & Sons, Inc., New York.

Though it was written for mining engineers by a man who is himself a mining engineer as well as a technical journalist, this book is not only valuable to all who aspire to write for the technical press but to men in all branches of engineering whose duty it is to make written reports, prospectuses, etc., or to convey information of any kind relating to their business through the medium of written language. Examples abound, taken principally from engineer's reports that have come under the author's observation both as an engineer and as editor, and the errors and commonly encountered faults are clearly pointed out.

If any adverse criticism is deserved, it is that the author is too much inclined to treat language as an art, ironbound by rule and convention through which no man can break without exposing himself to the stigma of ignorance, instead of a tool to be suited to individual needs.

Business Items

The machinery and other equipment of the Argo Mills plant at Gloucester City, Pa., is being dismantled and packed for shipment to Japan.

The stockholders of the Aetna Foundry and Machine Co., Warren, Ohio, at a recent meeting voted to increase the capital stock of the company from $50,000 to $300,000. Of this sum $100,000 of the increase will be issued at once, which will triple the present outstanding capital. Of the first issue, $60,000 of the proceeds of the sale will be used for additional working capital made necessary by the large increase of business. The second issue of $40,000 will be used for improvements to the plant and for additional equipment.

The Canadian Steel Foundries Co., Welland, Ontario, Can., will reopen its plant. The principal products to be manufactured are steel bars and angles.

The Knickerbocker Motors Co., Poughkeepsie, N. Y., will install about $25,000 worth of new machines.

Incorporation papers have been filed with the county clerk at Newark, N. J., for the Hope Foundry and Machine Co., 525 Main St., East Orange, N. J. The incorporators are Harry H. Pisking, S. E. Lynch and Gordon Grand.

J. E. Duff Co., 249 Center St., New York, machine-tool dealers, has leased an adjoining showroom, thereby doubling its showroom size.

Announcement is made of the partnership of Richardson & Gay, consulting engineers, 220 Devonshire St., Boston, Mass. Mr. Richardson, formerly of Richardson & Hale, consulting engineers, went overseas with the 26th Division and was discharged from the U. S. Army in 1919 as Lieutenant-Colonel, Field Artillery. Mr. Gay has been for the past nine years in the Boston office of Stone & Webster, division of construction and engineering.

The Black & Decker Manufacturing Co., Baltimore, Md., announces that its Cleveland office has been moved from 6523 Euclid Ave. to more spacious quarters at 6225 Carnegie Ave. The new office has a showroom as well as a completely equipped service station for the convenience of users of Black & Decker electric air compressors, portable electric drills and electric valve grinders. G. A. Dodge is in charge.

The M. A. Palmer Co. has moved its steel warehouse and offices to larger quarters at 383-385 Atlantic Ave., Boston, Mass.

The American Compound Co. has moved into its new office and factory at 383-386 Atlantic Ave., Boston, Mass.

The Federal Tool and Alloy Steel Co. will consolidate its main office now in the Woolworth Building, New York, with its warehouse at 60-66 Rutledge St., Brooklyn, N. Y., retaining a sales office at the old address. The company specializes in carbon and high-speed steel, swedish iron, etc.

The Davis-Bournonville Co., Jersey City, N. J., manufacturer of oxy-acetylene and oxy-hydrogen welding and cutting apparatus, has acquired a new and larger factory location for its Canadian plant which will be moved in June from Niagara Falls, Ontario, to Toronto. The Toronto sales office will be moved from its present location on King St. West, to quarters in the new factory building at 32-34 Eastern Ave. The location is adjacent to the immense harbor development now under way, convenient to rail and water terminals, and readily accessible to the business center. The company's Montreal sales office will be moved about June 1 from Craig St. West to quarters in the Coristine Building, St. Paul and St. Nicholas Sts., Montreal.

The Dalton Manufacturing Corporation announces a change of address of the New York office to 50 East 42d St. Customers wishing prompt service are requested to note this hange.

The Detroit office of the Gale-Sawyer Co., tool manufacturers has been changed to 289 Jefferson Ave. This office will continue under the management of E. N. Anthony.

Catalogs Wanted

The Department of Agriculture of the Mexican government is inquiring for catalogs, price lists and other descriptive literature pertaining to machinery and agricultural implements. Large quantities of these goods are being imported into Mexico through this source and there is an increasing demand for more.

The Cleveland Twist Drill Co., Cleveland, Ohio, has announced a revising of its catalog library. They would be pleased to receive catalogs and circular matter illustrating any product that might be of possible interest to them.

Export Opportunities

The Bureau of Foreign and Domestic Commerce, Department of Commerce, Washington, D. C., has inquiries for the agencies of machinery and machine tools. Any information desired regarding these opportunities can be secured from the above address by referring to the number following each item.

The American representative of firms in China desires to get in touch with exporters for the sale of coal mining and handling machinery, cement plants, chlorination works, sugar machinery, flour-milling machinery, match-making machinery, cotton spinning and knitting machinery, and rubber-plantation machinery. No. 32,561.

The Dhengle & Co., Fort Bombay, India, wishes to establish agency connections with a dealer in second-hand machine tools.

A mining corporation in South Africa desires to purchase electrical furnaces for the annealing etc., of drill steel, the furnace to be made of highly refractory material. Quotation should be given f.o.b. New York or nearest port of shipment. Payment, cash against documents. References. No. 32,689.

The American purchasing agent for a firm in Sweden desires to purchase machinery designed and constructed to grind a large number of axes automatically and simultaneously. References. No. 32,717.

A company in Norway desires to purchase machine tools, including punching, bending, and shearing machines, for heavy work. A description of the machines required were forwarded and may be had upon application for this opportunity number. Payment will be made through banks in Norway and in New York. References. No. 32,727.

Agents and firms in France desire to be placed in communication with manufacturers and exporters for the sale of automobiles, motors, construction material, electrical supplies, gas and electrical fixtures, machinery, metals, motorcycles, paper industry and machinery supplies, oils and greases, tools. No. 32,728.

An automobile garage firm in South Africa desires to purchase engineers' machine tools of a light type, bench and fine tools, motor accessories and sundries, and garage fittings and appliances. All are required immediately. It is also desired to secure agencies for the sale of agricultural implements, pumping plants light gasoline engines, windmills, galvanized pipe, cylinders, working heads, and pipe fittings. References. No. 32,696.

Forthcoming Meetings

The National Machine Tool Builders' Association will hold its spring meeting on May 20 and 21, at the Hotel Traymore, Atlantic City, N. J.

The Industrial Relations Association will hold its second annual convention at Chicago, Ill., on May 21, 22 and 23.

The American Society of Mechanical Engineers will hold its spring meeting at St. Louis, Mo., May 24, 25, 26, 27, 1920, and will have its headquarters at the Hotel Statler.

The American Iron and Steel Institute will hold its spring meeting at the Hotel Commodore, New York City, May 28.

The Railway Supply Manufacturers Association will hold an exhibit on Young's Pier at Atlantic City, June 9 to 16, in conjunction with the annual mechanical conventions of the American Railway Association. Many of the leading machine-tool builders of the country will be among the 330 or more exhibitors.

The American Drop Forge Association will hold a meeting at the Hotel Marlboro-Blenheim, Atlantic City, N. J., on June 17, 18 and 19. E. J. Frost, of the Frost Gear and Forge Co., Jackson, Mich., is president.

The American Society for Testing Materials will hold its next annual meeting during the week of June 21, 1920, at the New Monterey Hotel, Asbury Park, N. J. This society has its headquarters in the Engineers' Club Building, 1315 Spruce St., Philadelphia, Pa. C. L. Warwick is the secretary and treasurer.

The Society of Automotive Engineers will hold its annual summer meeting at Ottawa Beach, Mich., on June 21-25 inclusive.

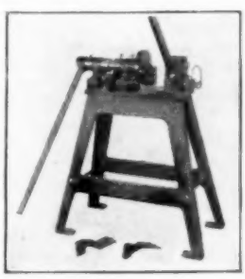
Condensed-Clipping Index of Equipment

Patented Aug. 20, 1918

Tapping Machine, "Way"
Foote-Burt Co., Cleveland, Ohio.
"American Machinist," May 6, 1920.

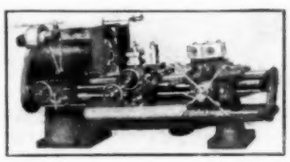
A 3-way multiple-spindle tapping machine for tapping holes from ¼ to 1¼ in. Spacing of the spindles is not adjustable. Spindle heads must be specially arranged for the work to be done. Spindle heads are carried on saddles on which they may be adjusted to compensate for taps of different lengths. When holes are tapped to predetermined depth the driving motor is automatically reversed and the tap "followed out" by the pilot wheel and the heads run back to the clearance point for loading. Two-, three- and four-way machines of the same type are made and are only intended for use where large quantities of duplicate work are handled.

Twisting Machine, Bar
Wallace Supplies Manufacturing Co., Chicago, Ill.
"American Machinist," May 6, 1920.



Machine is designed for giving a quarter twist to the ends of flat bars; and it is arranged for offsetting the stock so as to leave the twisted end in the same plane as the flat side of the bar instead of merely twisting about the center of the bar as an axis. Either hot or cold bars can be twisted, the necessity for heating being determined by the size of the bar. Machines are made to order only.

Lathe, Combination Turret
Alfred Herbert, Ltd., Coventry, England.
"American Machinist," May 6, 1920.

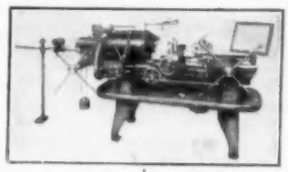


Made in three sizes Nos. 3, 9 and 20. The illustration shows No. 9. Constant speed drive through friction clutches and sliding gears provides 8 speeds for No. 3 machine, and 16 speeds for the two larger machines. Turret-slide apron provides feeds in either direction, six selective stops being furnished. Power rotation of turret provided for Nos. 3 and 9 machines. Taper attachment is part of regular equipment. Swing, over beds, 16½ in., 20 in., 28 in.; over cross slides, 8⅞ in., 12⅝ in., 18 in. Holes through spindles admit 2⅞ in., 3½ in., 4½ in. stock. Driving pulleys 10 in., 12 in., 14 in., all for 5-in. belt. Horsepower, 7-8-10. Net weights, 5,280-6,680-11,050 lb.

Drilling Machines, Sliding Head, 26- and 28- in.
Sibley Machine Co., South Bend, Ind.
"American Machinist," May 6, 1920.

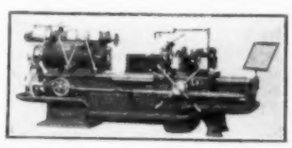
The general description of these machines is the same as described in the *American Machinist*, Shop Equipment News, Nov. 13, 1919, and the Clipping Index, Jan. 22, 1920, except in swing and size of tables, which, of course, add somewhat to the weight.

Lathe, Universal Turret
Alfred Herbert, Ltd., Coventry, England.
"American Machinist," May 6, 1920.



Designed for both chuck and bar work and is made in one size only. Can be supplied either with or without geared draw-in chuck and automatic bar-feed. The tail-rod has an adjustable ball-bearing carrier, which avoids necessity for using separate feed collars for every size of bar. Hexagon turret can be operated automatically or by hand. The turret slide is provided with six adjustable stops. Square turret for cross slides and a taper attachment can be furnished as extras. Draw-in chucking capacity, 1⅝ in. Spindle-hole capacity, 2 in. Spindle speeds, 8. Swing, over cross slide, 6¼ in. Tool holes in turret, 1¼ in. Automatic feeds, 4. Weight, net, with plain head, 2,256 lb., with draw-in chuck and bar feed, 2,460 lb.

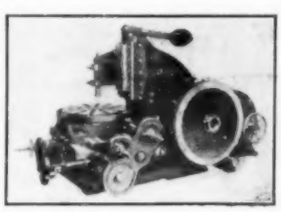
Lathe, Hexagon Turret
Alfred Herbert, Ltd., 54 Dey St., New York City.
"American Machinist," April 29, 1920.



A quick power traverse is provided for the turret slide and the Nos. 4 and 13 lathes have power rotated turrets. The No. 1 machine is fitted with a geared draw-in chuck, the other two having double toggle chucks that may be operated while in motion.

Specifications: Bar capacities, 1⅝ in., 2⅞ in. 3½ in. Greatest length turned, 27 in., 36 in., 42 in. Diameter of pulleys, 8 in., 10 in., 14 in. Belts, 4 in., 5 in., 5½ in. Spindle speeds, 8, 8, 16. Feeds 6, 12, 9. Horsepower requirements, 5, 7, 10. Net weights, 3,376 lb., 5,550 lb., 8,400 lb.

Slotting Machine
Alfred Herbert, Ltd., 54 Dey St., New York City.
"American Machinist," May 6, 1920.

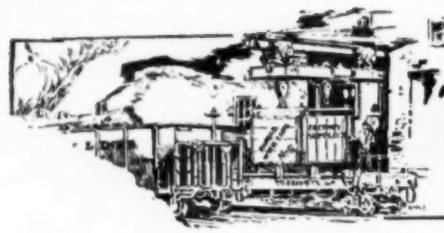


Machine built by Muir in England. Specially recommended by the maker for tooling deep work beyond the scope of the milling machine. The table is solidy mounted on large square slides provided with adjustable gibs. Stroke can be quickly adjusted. Tool holders can be furnished in a variety of forms to suit a wide range of work. Machine is built in four sizes with maximum strokes of 8½, 12½, 15 and 18 in. respectively. Table diameters range from 27 to 42 in., and net weights from 12,100 to 33,000 lb.

Punch, No. 20 Combination
Parker Supply Co., Inc., 785 East 135th St., New York, N. Y.
"American Machinist," May 6, 1920.

May be used either as a hand or a bench tool, as it is quickly detachable from the bracket fastened to the bench. The open jaw and deep throat accommodate work with rolled or formed edges. Equipped with gage for spacing parallel holes, also an adjustable stripper which may be removed when not needed. Made of drop-forged heat-treated steel with hardened working parts. Will punch ½-in. hole in 20-gage steel, or the equivalent. Weight, 4¼ lb.

Clip, paste on 3 x 5-in. cards and file as desired



THE WEEKLY PRICE GUIDE

IRON AND STEEL

PIG IRON—Quotations compiled by The Matthew Addy Co.:

CINCINNATI	Current	One Year Ago
No. 2 Southern	$45.60	$30.35
Northern Basic	42.80	27.55
Southern Ohio No. 2	46.80	28.55
NEW YORK—TIDEWATER DELIVERY		
2X Virginia (Silicon 2.25 to 2.75)	49.65	31.90
Southern No. 2 (Silicon 2.25 to 2.75)	49.70	33.95
BIRMINGHAM		
No. 2 Foundry	42.00	26.75
PHILADELPHIA		
Eastern Pa., No. 2x, 2.25–2.75 sil.	45.35–45.65*	30.65
Virginia No. 2	44.25*	30.85
Basic	44.50†	30.90
Grey Forge	43.50*	30.90
CHICAGO		
No. 2 Foundry local	44.25	27.25
No. 2 Foundry, Southern	47.00	31.75
PITTSBURGH, INCLUDING FREIGHT CHARGE FROM VALLEY		
No. 2 Foundry	45.65	28.15
Basic	44.40	27.15
Bessemer	44.90	29.35
MONTREAL		
Silicon 2.25 to 2.75%.	43.25	.....

* F.o.b. furnace. † Delivered.

STEEL SHAPES—The following base prices per 100 lb. are for structural shapes 3 in. by ¼ in. and larger, and plates ¼ in. and heavier, from jobbers' warehouses at the cities named:

	New York			Cleveland		Chicago	
	Current	One Month Ago	One Year Ago	Current	One Year Ago	Current	One Year Ago
Structural shapes	$4.47	$3.97	$3.47	$5.50	$3.37	$3.97	$3.47
Soft steel bars	4.62	4.12	3.37	5.00	3.27	3.87	3.37
Soft steel bar shapes	4.62	4.12	3.37		3.27	3.87	3.37
Soft steel bands	5.82	5.32	4.07	6.25	.....	.....	.....
Plates, ¼ to 1 in. thick	4.67	4.17	3.67	5.00	3.57	4.17	3.67

BAR IRON—Prices per 100 lb. at the places named are as follows:

	Current	One Year Ago
Mill, Pittsburgh	$4.25	$2.35
Warehouse, New York	4.57	3.37
Warehouse, Cleveland	3.52	3.22
Warehouse, Chicago	3.75	3.37

SHEETS—Quotations are in cents per pound in various cities from warehouse; also the base quotations from mill:

Blue Annealed	Large Mill Lots Pittsburgh	New York Current	New York One Year Ago	Cleveland	Chicago
No. 10	3.55–6.00	7.12@8.00	4.57	7.55	7.02
No. 12	3.60–6.05	7.17@8.05	4.62	7.65	7.07
No. 14	3.65–6.10	7.22@8.10	4.67	7.70	7.12
No. 16	3.75–6.20	7.32@8.20	4.77	7.80	7.22
Black					
Nos. 18 and 20	4.15–6.30	8.50@9.50	5.30	8.20	7.80
Nos. 22 and 24	4.20–6.35	8.55@9.55	5.35	8.25	7.85
No. 26	4.25–6.40	8.60@9.60	5.40	8.30	7.90
No. 28	4.35–6.50	8.70@9.70	5.50	8.40	8.00
Galvanized					
No. 10	4.70–7.50	9.75@11.00	5.50	8.50	8.15
No. 12	4.80–7.60	9.85@11.00	5.55	8.60	8.20
No. 14	4.80–7.60	9.85@11.10	5.60	8.60	8.35
Nos. 18 and 20	5.10–7.90	10.10@11.40	5.90	8.90	8.65
Nos. 22 and 24	5.25–8.02	10.25@11.55	6.05	9.05	9.05
No. 26	5.40–8.20	10.40@11.70	6.20	9.20	9.20
No. 28	5.70–8.50	10.70@12.00	6.50	9.50	9.50

Acute sensitivity in sheets, particularly black, galvanized and No. 16 blue enameled.

Automobile sheets are unavailable except in fugitive instances, when prices range to 10c per lb.

COLD FINISHED STEEL—Warehouse prices are as follows:

	New York	Chicago	Cleveland
Round shafting or screw stock, per 100 lb. base	$6.25	$5.80	$6.00
Flats, squares and hexagons, per 100 lb. base	6.75	6.30	6.50

DRILL ROD—Discounts from list price are as follows at the places named:

	Per Cent.
New York	55
Cleveland	50
Chicago	50

SWEDISH (NORWAY) IRON—The average price per 100 lb., in ton lots is:

	Current	One Year Ago
New York	$20.00	$25.50–30.00
Cleveland	20.00	20.00
Chicago	21.00	16.50

In coils an advance of 50c. usually is charged.
Domestic iron (Swedish analysis) is selling at 12c. per lb.

WELDING MATERIAL (SWEDISH)—These prices are the best we have been able to obtain for Swedish welding materials, of which it is reported that very little are on the market.

Welding Wire		Cast-Iron Welding Rods	
1/16, 5/64, 3/32, 7/64, 1/8, 9/64, No. 8, 5/32 and No. 10	21.00 to 30.00	1/4 by 12 in. long	14.00
11/64		1/4 by 19 in. long	12.00
No. 12		3/8 by 19 in. long	10.00
13/64, No. 14 and 7/32		1/2 by 21 in. long	10.00
No. 18		Special Welding Wire, Coated	
No. 20		1/16	33.00
		5/32	30.00

Domestic—Welding wire in 100-lb. lots sells as follows, f. o. b. New York: 3/32, 8½c. per lb.; 1/8, 8c.; 5/32 to 1/4, 7½c.

MISCELLANEOUS STEEL—The following quotations in cents per pound are from warehouse at the places named:

	New York Current	Cleveland Current	Chicago Current
Openhearth spring steel (heavy)	6.00	8.00	9.00
Spring steel (light)	8.00	11.00	12.25
Coppered bessemer rods	8.00	8.00	6.75
Hoop steel	6.07	6.50	5.32
Cold-rolled strip steel	12.50	8.25	10.75
Floor plates	6.80	6.00	6.77

PIPE—The following discounts are to jobbers for carload lots on the Pittsburgh basing card, discounts on steel pipe, applying as from January 14, 1920, and on iron pipe from January 7, 1920.

Steel BUTT WELD Inches	Black	Galvanized	Inches	Iron Black	Galvanized
1/8, 1/4 and 3/8	47%	20½%	3/4 to 1¼	34½%	18½%
1/2	51%	36½%			
3/4 to 3	54%	41½%			
LAP WELD					
2	47%	34½%	2	28½%	14½%
2½ to 6	50%	37½%	2½ to 6	30½%	17½%
BUTT WELD, EXTRA STRONG PLAIN ENDS					
1/8, 1/4 and 3/8	43%	25½%	3/4 to 1	34½%	19½%
1/2	48%	35½%			
3/4 to 1¼	52%	39½%			
LAP WELD, EXTRA STRONG PLAIN ENDS					
2	45%	33½%	2	29½%	16½%
2½ to 4	48%	36½%	2½ to 4	31½%	19½%
4½ to 6	47%	35½%	4½ to 6	30½%	18½%

Stock discounts in cities named are as follows:

	New York Black	New York Galv.	Cleveland Black	Cleveland Galv.	Chicago Black	Chicago Galv.
3/8 to 3 in. steel butt welded	40%	24%	40%	31%	54%	40½%
2½ to 6 in. steel lap welded	35%	20%	42%	27%	50%	37½%

Malleable fittings. Class B and C, banded, from New York stock sell at plus 23%. Cast iron, standard sizes, net.

METALS

MISCELLANEOUS METALS—Present and past New York quotations in cents per pound, in carload lots:

	Current	Month Ago	Year Ago
Copper, electrolytic	19.25	18.50	15.25
Tin in 5-ton lots	55.75	61.50	72.50
Lead	8.70	9.00	4.70
Spelter	8.62½	8.70	6.37½
ST. LOUIS			
Lead	8.40	8.87½	4.95
Spelter	7.60	8.37½	6.02½

At the places named, the following prices in cents per pound prevail, for 1 ton or more:

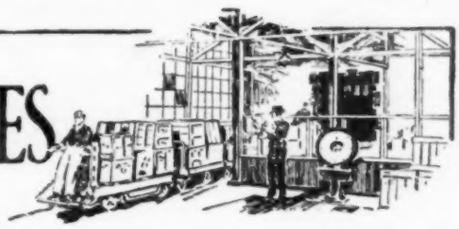
	New York Current	New York Month Ago	New York Year Ago	Cleveland Current	Cleveland Year Ago	Chicago April 8 Current	Chicago April 8 Year Ago
Copper sheets, base	29.50	29.50	22.50	32.00	23.50	36.00	26.00
Copper wire (carload lots)	31.25	29.25	23.00	29.50	23.00	27.00	22.00
Brass sheets	27.50	26.50	18.75	29.00	23.00	27.00	21.50
Brass pipe	32.00	32.00	28.00	34.00	30.00	35.00	31.00
Solder (half and half) (case lots)	43.00	39.00	46.50	40.50	38.00	39.00	

Copper sheets quoted above hot rolled 16 oz., cold rolled 14 oz. and heavier, add 2c.; polished takes 5c. per sq.ft. extra for 20-in. widths and under; over 20 in., 7½c.

BRASS RODS—The following quotations are for large lots, mill. 100 lb. and over, warehouse; net extra:

	Current	One Year Ago
Mill	23.75	18.00
New York	23.75	19.50
Cleveland	27.00	24.00
Chicago	26.00	24.00

SHOP MATERIALS AND SUPPLIES



ZINC SHEETS—The following prices in cents per pound prevail:

Carload lots f.o.b. mill 12.00

	—In Casks—		— Broken Lots —	
	Current	One Year Ago	Current	One Year Ago
Cleveland	15.00	14.45	15.50	14.80
New York	13.50	12.00	14.00	13.00
Chicago	15.00	16.50	15.00	16.00

ANTIMONY—Chinese and Japanese brands in cents per pound, in ton lots for spot delivery, duty paid:

	Current	One Year Ago
New York	11.25	6.62½
Chicago	11.50	7.75
Cleveland	12.50	7.75

OLD METALS—The following are the dealers' purchasing prices in cents per pound:

	— New York —		—Cleveland—		
	Current	One Year Ago	Current	One Year Ago	Chicago
Copper, heavy, and crucible	16.25@16.75	13.00	16.50	14.00	17.25
Copper, heavy, and wire	15.75@16.00	12.00	16.50	13.00	16.25
Copper, light, and bottoms	14.00@14.50	10.50	15.00	11.00	15.25
Lead, heavy	7.25@7.50	4.00	7.00	4.50	7.75
Lead, tea	5.50@6.00	3.25	5.00	3.50	6.75
Brass, heavy	10.00@10.50	8.00	12.50	9.00	17.00
Brass, light	8.50@9.00	6.00	10.00	6.50	10.50
No. 1 yellow brass turnings	9.75@10.25	7.25	10.00	7.00	10.75
Zinc	5.00@5.25	4.25	5.00	4.00	6.50

ALUMINUM—The following prices are from warehouse at places named:

	New York	Cleveland	Chicago
No. 1 aluminum, 98 to 99% pure, in ingots for remelting (1-15 ton lots), per lb.	33.00	34.00c.@35.00c.	33.50

COPPER BARS—From warehouse sell as follows in cents per pound, for ton lots and over:

	Current	One Year Ago
New York (round)	33.00	25.00
Chicago	29.00	28.00
Cleveland	32.00	28.00

BABBITT METAL—Warehouse price per pound:

	—New York—		—Cleveland—		— Chicago —	
	Current	One Year Ago	Current	One Year Ago	Current	One Year Ago
Best grade	90.00	87.00	74.50	79.00	70.00	75.00
Commercial	50.00	42.00	21.50	18.50	15.00	15.00

SHOP SUPPLIES

NUTS—From warehouse at the places named, on fair-sized orders, the following amount is deducted from list:

	— New York —		— Cleveland —		— Chicago —	
	Current	One Year Ago	Current	One Year Ago	Current	One Year Ago
Hot pressed square	+$4.00	.25	$ .75	$1.90	$.50	1.28
Hot pressed hexagon	+ 4.00	.25	.75	1.90	.50	1.08
Cold punched hexagon	+ 4.00	.25	.75	1.90	.50	1.30
Cold punched square	+ 4.00	.25	.75	1.90	.50	1.30

Semi-finished nuts, ⅞ and smaller, sell at the following discounts from list price:

	Current	One Year Ago
New York	30%	50–10%
Chicago	50%	50%
Cleveland	50%	60-10-10%

MACHINE BOLTS—Warehouse discounts in the following cities:

	New York	Cleveland	Chicago
½ by 4 in. and smaller	list	40%	30%
Larger and longer up to 1¼ in. by 30 in.	+20%	20–10%	20%

WASHERS—From warehouses at the places named the following amount is deducted from list price:

For wrought-iron washers:

New York ..... list Cleveland ..... $3.00 Chicago $3.00

For cast-iron washers, ⅜ and larger, the base price per 100 lb. is as follows:

New York ..... $7.00 Cleveland ..... $4.50 Chicago $4.25

CARRIAGE BOLTS—From warehouses at the places named the following discounts from list are in effect:

	New York	Cleveland	Chicago
½ by 6 in. and smaller	10%	35%	20%
Larger and longer up to 1 in. by 30 in.	10%	20%	15%

COPPER RIVETS AND BURS sell at the following rate from warehouse:

	Rivets		Burs	
	Current	One Year Ago	Current	One Year Ago
Cleveland	20%	20%	10%	10%
Chicago	10%	10%	10%	10%
New York	25%	40%	5%	20%

RIVETS—The following quotations are allowed for fair-sized orders from warehouse:

	New York	Cleveland	Chicago
Steel ½ and smaller	30%	40%	35-10%
Tinned	30%	40%	35-10%

Boiler, ½, ⅝, 1 in. diameter by 2 to 5 in. sell as follows per 100 lb.:

New York...$7.00 Cleveland...$4.00 Chicago....$5.37 Pittsburgh...$4.72

Structural, same sizes:

New York...$7.10 Cleveland...$4.10 Chicago....$5.47 Pittsburgh....$4.82

MISCELLANEOUS

SEAMLESS DRAWN TUBING—The base price in cents per pound from warehouse in 100-lb. lots is as follows:

	New York	Cleveland	Chicago
Copper	32.00	34.00	35.00
Brass	30.50	34.00	34.00

For immediate stock shipment 3c. is usually added. The prices, of course, vary with the quantity purchased. For lots of less than 100 lb., but not less than 75 lb., the advance is 2c.; for lots of less than 75 lb., but not less than 50 lb. advance is 5c. over base (100-lb. lots); less than 50 lb., but not less than 25 lb. 10c. should be added to base price; quantities from 10-25 lb., extra is 25c.; less than 10 lb., add 35c.

Double above extras will be charged for angles, channels and sheet metal mouldings if ordered in above quantities. Above extras also apply to brass rod other than standard stock sizes—stock sizes being considered as ⅛-2 in. inclusive in rounds, and ⅜-1½ in., inclusive, in square and hexagon—all varying by thirty seconds up to 1 in. by sixteenths over 1 in. On shipments aggregating less than 100 lb., there is usually a boxing charge of $1.50.

LONG TERNE PLATE—In Chicago No. 28 primes from stock sell, nominally, for $8.50 per 100 lbs.

COTTON WASTE—The following prices are in cents per pound:

	— New York —			
	Current	One Year Ago	Cleveland	Chicago
White	11.00@15.50	13.00	16.00	11.00 to 14.00
Colored mixed	7.00@10.50	9.00–12.00	12.00	9.50 to 12.00

WIPING CLOTHS—Jobbers' price per 1000 is as follows:

	13¼x13¼	13¼x20½
Cleveland	55.00	65.00
Chicago	41.00	43.50

SAL SODA sells as follows per 100 lb.:

	Current	One Month Ago	One Year Ago
New York	$2.25	$2.25	$1.75
Philadelphia	2.00	2.00	1.75
Cleveland	2.50	2.50	2.75
Chicago	2.25	2.25	2.00

ROLL SULPHUR in 360-lb. bbl. sells as follows per 100 lb.:

	Current	One Month Ago	One Year Ago
New York	$4.00	$4.00	$3.65
Cleveland	4.25	4.25	3.62
Chicago	5.00	5.00	5.00

COKE—The following are prices per net ton at ovens, Connellsville:

	May 6	Apr. 29	Apr. 15
Prompt furnace	$11.00@$12.00	$11.00@$12.00	$11.00@$12.00
Prompt foundry	12.00@13.00	12.00@13.00	12.00@13.00

FIRE CLAY—The following prices prevail:

		Current
Ottawa, bulk in carloads	Per Ton	$8.00
Cleveland	100-lb. bag	1.00

LINSEED OIL—These prices are per gallon:

	— New York —			— Chicago —	
	Current	One Year Ago	Cleveland	Current	One Year Ago
Raw in barrels (5 bbl. lots)	$1.78	$1.59	$2.00	$2.05	$1.78
5-gal. cans (without cans)	1.78*	1.72	2.25	2.30	1.98

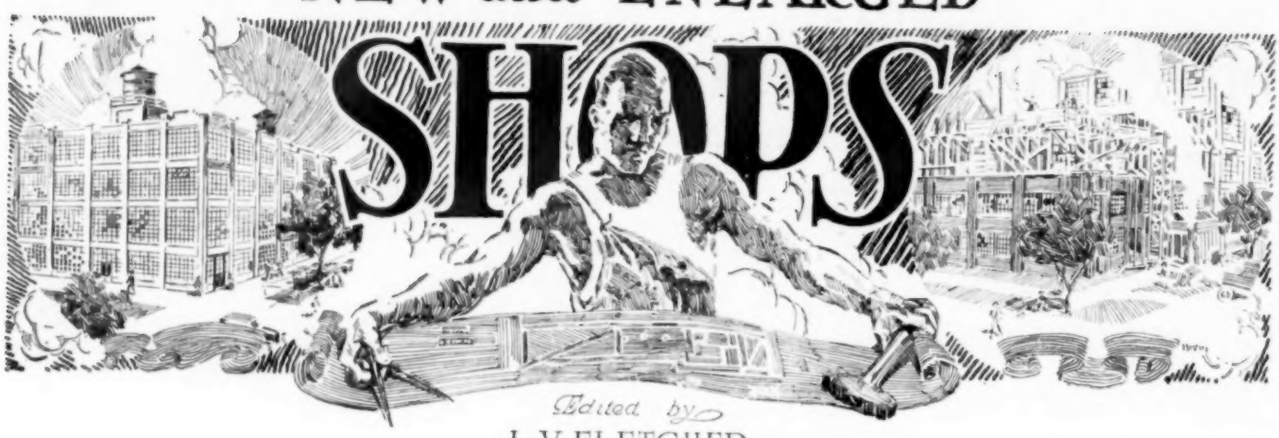
*To this *oil* price must be added the cost of the cans (returnable), which is $2.25 for a case of six.

WHITE AND RED LEAD—Base price per pound:

	Red				White			
	Current		One Year Ago		Current		One Year Ago	
	Dry	In Oil	Dry	In Oil	Dry and In Oil	Dry and In Oil		
100 lb. keg	15.50	17.00	13.00	14.50	15.50	13.00		
25 and 50-lb. kegs	15.75	17.25	13.25	14.75	15.75	13.25		
12½-lb. keg	16.00	17.50	13.50	15.00	16.00	13.50		
5-lb. cans	18.50	20.00	15.00	16.50	18.50	15.00		
1-lb. cans	20.50	22.00	16.00	17.50	20.50	16.00		

500 lb. lots less 10% discount. 2000 lb. lots less 10–2½% discount.

NEW *and* ENLARGED SHOPS



Edited by
L-V-FLETCHER

Machine Tools

The following concerns are in the market for machine tools:

Conn., New Haven—The G. B. Wuestefeld Co., 190 Whaley Ave.—repair tools for truck work, etc.

D. C., Washington—A. L. Flint, Agt. for the Panama Canal, Washington, D. C., will receive bids until May 25 for furnishing the following tools:

One cutting and threading machine for 3 in. pipe, motor driven.
One vertical machine punch, motor driven.
One wood worker, complete with 16 in. jointer (safety head) 26 in. band saw, 1 x 7 in. shaper, 30 x 38 in. sawtable and 8 x 24 in. borer.
Miscellaneous hand tools.

Md., Baltimore—The Harvey Co., 113 South St., H. C. Busick, Purch. Agt.—one No. 2 universal milling machine, and lathes for turning rolls, 26 in. over carriage, with 18 or 20 ft. centers, specifying hold in spindle (new or used).

N. J., Newark—The Van Sickelen Speedometer Co.—automatic screw machines, millers and lathes.

N. Y., Albany—F. D. Easterbrook, 330 Bway.—one 10 in. screw cutting engine lathe, one bench lathe, 3 jaw chuck, and one drill press.

N. Y., Albany—The E. R. Trice Motor Co., 360 Bway.—machine tools for automobile and truck repair.

N. Y., Buffalo—A. W. Bergener, 522 Franklin St.—one square shears foot power, 48 in. or smaller, and one roller 18 to 30 in.

N. Y., Geneva—The Geneva Auto Co.—machine tools for automobile and truck repair.

N. Y., Little Falls—Thomas & Dineen—light machine tools for automobile and truck repair.

N. Y., Mount Morris—The Empire Machine Wks.—radial drill, (used), and one power hack saw.

N. Y., New York (Borough of Brooklyn)—The Arma Eng. Co., 228 40th St.—one plane grinder, about 36 in.

N. Y., New York (Borough of Manhattan)—The Lord Constr. Co., 105 West 40th St.
Six heavy duty lathes, distance between centers, 14 in. x 4 ft., 10 ½ in., 21 in. x 9 ft. 2 in., 14 in. x 6 ft., 17 in. x 8 ft., 21 in. x 7 ft. 2 in., and 25 in. x 12 ft.
One 25 in. x 10 ft. heavy duty combination turret lathe.
Five 18 in. double wheel, Ransom grinders or equal.
One 16 x 23 x 14¾ in. and one 24 in. heavy duty shaper.
One sensitive drill, 16 x 16 in. table, 1 spindle, Pierle or equal.
Three drills, Aurora or equal, one with 20 in. stationary head, one with 24 in. sliding head, and one with 32 in. sliding head.
One No. 3 hack saw, Robertson or equal.
One No. 4 universal heavy duty miller, LeBlond or equal.
One full universal type radial drill, 4 ft. arm and one 6 ft. arm, Niles or equal.
One No. 6A keyseater, Niles.
One 2 in. single bolt cutter.
One ¼ to 3 in. and one 2½ to 8 in. standard pipe threading machine.
One 84 in. heavy pattern vertical boring and turning mill.
One 80 in. horizontal boring and drilling machine.
One 800 lb. steam hammer.
One bending roll, capacity 32 ft. to 1 in.
Two 48 in. throat punches, capacity 1¼ in. hole through 1 in. plate.
Two 48 in. throat shears, capacity 1 in.
One 10 in. throat, style T, angle punch, capacity 1 in. through 1 in. plate, Cleveland or equal.
One No. 4, double angle shear, capacity 6 x 6 x 1 in., Cleveland or equal.
One 30 in. single cylinder surface planer.
One 13 ft. arm wall radial drill, Cleveland or equal.
One 24 in. pattern maker's lathe.
One 40 in. band saw.
These tools to be arranged for motor drive 220 v., a.c., 60 cycles, 3 phase.

N. Y., New York (Borough of Manhattan)—Mitsubishi Co., 120 Bway.—machine tools for shipyard in Japan.

N. Y., New York (Borough of Manhattan)—Morey & Co., Broome and Lafayette Sts.—punches, shears, and general line of metal working machinery.

N. Y., New York (Borough of Manhattan)—The H. Prentiss Co., 149 Bway.—one double end, ½ in. round capacity, 48 in. gap punch and shear, one keyseater and one 6 in. pipe cutting and threading machine.

N. Y., New York (Borough of Manhattan)—The United Engraving Wks., 10 East 14th St.—one Becker No. 2 miller, motor attached, speed varying from 200 to highest attainable on this machine.

N. Y., Watertown—J. J. Moore, 557 Pearl St.—light machine tools and equipment for repair and precision machine work.

N. Y., Watertown—The Weldon Sales Co., 304 Factory St.—lathe, planer, power hack saw and drill press.

Pa., Chester—The Chester Shipbuilding Co.—punches and shears.

Pa., Philadelphia—The Diamond Garage Co., 2316 North 15th St.—garage equipment.

Pa., Philadelphia—J. Goodwin, 215 Fitzwater St.—garage equipment.

Pa., Philadelphia—The Standard Crown Co., Hope and Palmer Sts.—machine tools.

Pa., Pittsburgh—The Miller Saw Trimmer Co., Point Bldg.—presses for stamping.

N. C., Greensboro—The Newman Machine Co.—one 16 in. x 10 ft., quick change engine lathe, 4 step cone, single back gear, taper attachment, LeBlond, Lodge & Shipley or equivalent (new).

Ill., Chicago—The Atchison, Topeka & Santa Fe Ry., Ry. Exch. Bldg.—one spindle 20 in. upright drill press, similar to Manning, Maxwell & Moore No. 11950.

Ill., Chicago—The Rock Island Lines (Chicago, Rock Island & Pacific Ry.), 179 West Jackson Bl.—
One 36 x 36 in. x 12 ft. planer, belt drive, 2 heads on rail.
One No. 1½ double head bolt cutter, belt drive.
One 44 x 44 in. x 12 ft. planer, reversing motor drive, 2 heads on rail, heavy duty, 230 v., d.c.

Ill., Chicago—The Standard Oil Co., 910 South Michigan Ave.—1 type A 110, portable electric 2 post grinder, complete, for 110 v., a.c., 60 cycle, 3 phase.

Ill., Chicago—Worms & Loeb, 210 West Adams St.—straw-board cutting shears with 45 or 50 in. blade.

Mich., Battle Creek—The Amer. Steam Pump Co., 60 Maple St.—one 21 in. Gisholt automatic turret lathe.

Mich., Detroit—J. C. Austerberry, 65 Shelby St.—one 48 or 60 in. vertical milling machine with 2 heads, one plate straightening roll with capacity for 1 x 36 in. plates, 4 ft. between housings, and 1 heavy duty drill press with 2 in. capacity. Baker or equivalent.

Mich., Detroit—The A. Colton Co., 782 Jefferson Ave.—equipment for manufacture of special machinery.

Mich., Detroit—The General Metals Co., 895 Greenwood Ave.—machine tool equipment for manufacture of multi-trundle thread milling machines.

Mich., Detroit—The E. F. Lyons Spring and Axle Co., Milwaukee Ave.—machine tool equipment for manufacture of automobile springs.

Mich., Detroit—The Mul-Bow Machine Co., 33 Woodbridge St.—small lathe.

Mich., Detroit—The Wills Lee Corp., Book Bldg., A. Blackington, Purch. Agt.—vertical boring mills and general machine equipment.

Mich., Jackson—The General Machine and Tool Co.—lathes and universal grinder.

Mich. Marysville—The Michigan Bushings Corp., A. Leighton, Purch. Agt.—presses and general equipment for manufacture of bronze bushings for automobiles.

Mich., Muskegon—The L. O. Gorton Mfg. Co.—miscellaneous machine tool equipment for manufacture of automobile parts.

Mich., Saginaw—The City, c/o R. F. Johnson, Comr. of Light and Water, City Hall—general equipment for machine and repair shops.

O., Akron—The B. F. Goodrich Co., South Main St.—one 54 in. and one 42 in. vertical boring mill, one 5 ft. radial drill and 4 No. 2120 vises with swivel bases.

O., Alliance—The Transue Williams Steel Forging Corp.—miscellaneous machine equipment.

O., Canton—The Advance Dairy Mchy. Co., 1210 High Ave., S. W.—one shaper, one universal milling machine and one 28 in. lathe.

O., Canton—The United Eng. Co., 13th St., N. E.—12 lathes.

O., Cleveland—The Akron Spark Plug Co., 9000 Woodland Ave.—one No. 2 and one No. 3 Rockford plain power press.

O., Cleveland—The Central Brass Mfg. Co., 6203 Cedar Ave.—one buffing lathe, 1¼ in. spindle, motor driven.

O., Marion—The United Phonograph Co., M. L. Carey, Pres.—drill presses, shapers, and wood working machinery.

O., Medina—The Medina Mfg. Co.—special machinery for manufacture of spot lights, including shapers, drill presses and grinders.

Wis., Fond du Lac—The Vulcan Mfg. Co., 490 North Main St.—punch presses.

Wis., Milwaukee—The Amer. Electric Co., 140 West Water St.—presses and general line of machine tools.

Wis., Milwaukee—The Bolmes Mchy. Co., 131 Lincoln Ave.—one 10 in. x 6 ft. engine lathe.

Wis., Milwaukee—The C. and G. Mfg. Co., 700 Montgomery Bldg.—one 18 in. lathe, one 20 in. shaper, one No. 2 milling machine and two grinders for light work.

Wis., Milwaukee—The Pillar Products Co., Lincoln Ave. and Alexandria St., G. B. Pillar, Purch. Agt.—automatic screw machine.

Wis., Milwaukee—J. D. Wanvig, 193 Bway.—multiple drills.

Wis., Racine—The Sterling Metal Products Co.—squaring shears.

Wis., Racine—The Wohlrab Gear Co., Secor Bldg.—gear cutters.

Mo., St. Louis—The Water Dept., City Hall, E. E. Wall, Purch. Agt.—
One blue print machine cost $2,500.
Two 18 in. lathes, $4,500.
One planer, $700.
One drill press, direct connected to motor, $300.

Que., Montreal—The A. R. Williams Machine and Supply Co., 320 James St.—1 combination spur and bevel gear cutter to cut gears down to 3 diametrical pitch in steel.

Machinery

The following concerns are in the market for machinery:

Mass., Springfield—The N. S. Envelope Co., Cypress St.—machinery for envelope manufacture.

N. Y., East Syracuse—The Benedict Mfg. Co. —automatic machine for the manufacture of knife handles with small slit in one end to take blade; capacity, 600 per hour.

N. Y., Herkimer—The Hubbard Heel Co., Inc. —wood working machinery and special heel making machinery.

N. Y., Herkimer—The Sherer Gillett Co.—woodworking tools, machinery and equipment.

N. Y., Herkimer—The Universal Counter Co. —woodworking tools, machinery and equipment.

N. Y., Herkimer—The West Canada Lumber Co.—sawmill machinery and equipment.

N. Y., Nassau—A. S. Prior—wood planer and matcher.

N. Y., Watertown—E. J. Gabourie, 422 Dimmick St.—wood working machinery.

Ky. Bowling Green—The Amer. Producing and Refining Co.—machinery for oil refinery.

Va., Richmond—The Standard Paper Mfg. Co., Hull and Canal Sts.—$300,000 worth of paper manufacturing machinery.

W. Va., Morgantown—The Seaman Mill and Lumber Co.—wood working machinery.

Ind., East Chicago—The Edwards Valve and Mfg. Co.—one pipe bending machine, capacity ¾ to 1½ in.

Mich., Detroit—The Newton Packing Co., 1041 14th Ave.—carrier system, overhead track, etc.

Mich., Saginaw—The Herzog Art Furniture Co., 1900 South Michigan St.—wood working equipment.

O., Cleveland—The Guide Motor Lamp Mfg. Co., 11500 Madison Ave.—one electric chain hoist, one half to one ton capacity.

O., Columbus—The Case Automotive Rebuilding Co., 402 Mt. Vernon Ave., E. Schank, Purch. Agt.—cylinder grinders and some special machinery.

Wis., Fond du Lac—The Northern Casket Co., 16 North Brooke St.—wood working machinery.

Wis., Milwaukee—A. L. Beetz, 876 23rd St. —variety wood-worker composed of circular saw table, band saw, jointer and boring machine.

Wis., Milwaukee—The A. C. Goethal Co. 301 4th St.—machinery for sheet metal working.

Wis., Milwaukee—The H. A. Poppert Mfg. Co., 505 Cedar St.—foundry equipment.

Wis., Tomahawk—The Pride Pulp & Paper Co.—travelling crane.

Cal., Bishop—The Bishop Union High School District, J. H. Stofflet, clk.—manual training equipment.

Ont., Listowell—Hoover & Sinclair—$10,000 worth of flax machinery.

Metal Working

NEW ENGLAND STATES

Conn., Bridgeport—The G. B. Wuestefield Co., 190 Whalley Ave., New Haven, will soon award the contract for the construction of a 1 story, 90 x 210 ft. service station and sales room on Fairfield and Holland Aves., here. Estimated cost, $75,000. C. S. Palmer, 114 Whitney Ave., New Haven, Archt.

Conn., Hartford—Dragat & Toubman, 340 Windsor Ave., are having plans prepared by G. A. Zunner, Engr. and Archt., 756 Main St., for the construction of a 3 story, 100 x 100 ft. garage. Estimated cost, $100,000.

Mass., Millbury—The Al Fontaine Co., Elm St., is building a plant for the manufacture of improved pulley pins case support for Fords, etc. A. C. Fontaine, Mgr.

Mass., Springfield—The Brightwood Brass and Bronze Fdry., Birnie Ave., will soon award the contract for the construction of a 1 story, 55 x 65 ft. foundry addition. Estimated cost, $20,000.

Mass., Springfield—Chaplin & Chaplin, 374 Main St., are having plans prepared by A. W. Cobb, Archt., 374 Main St., for the construction of a garage and sales room on State St. Estimated cost, $50,000.

Mass., Willimansett (Holyoke P. O.)—The Stevens-Duryea Co., Chicopee Falls, has awarded the contract for the construction of two 1 story, 300 x 320 ft. factories for the manufacture of automobiles, and a 1 story, 60 x 270 ft. heat treating building. Estimated cost, $800,000.

R. I., Providence—The Diamond Co., 325 Fountain St., has awarded the contract for the construction of a 1 story, 50 x 140 ft. garage on Battery St. Estimated cost, $35,000. Noted May [illegible]

MIDDLE ATLANTIC STATES

Md., Baltimore—The Standard Oil Co., Pier 2, Pratt St., has awarded the contract for the construction of a 1 story, 66 x 99 ft. garage and service station on Central and Eastern Aves. Estimated cost $75,000. Noted May 13.

Md., Hagerstown—The W. H. Reisner Mfg. Co., 66 West Washington St., is having plans prepared by F. J. Mack, Archt., Negley Bldg., for the construction of a 3 story, 38 x 104 ft. and 35 x 45 ft. plant, for the manufacture of mechanical specialties. Estimated cost, $100,000.

N. J., Bordentown—The State Industrial Comn., Trenton, will receive bids until May 25 for the construction of a 1 story, 42 x 110 ft. workshop addition at the state industrial school, here. Estimated cost, $20,000. F. H. Bent, 142 West State St., Trenton, Archt.

N. Y., Geneva—The Geneva Auto Co., 145 Castle St., plans to build a 2 story addition to its machine shop. Cost between $20,000 and $25,000.

N. Y., New York (Borough of Brooklyn)—M. Goetz, 1581 President St., will build a 1 story, 50 x 110 ft. garage at 104 Lawrence St. Estimated cost, $25,000.

N. Y., New York (Borough of Brooklyn)—O. Gruhn, 221 Boerum St., will build a 2 story, 100 x 100 ft. garage on Bushwick and Myrtle Aves.

N. Y., New York (Borough of Brooklyn)—The M. C. K. Cont. Co., 1438 Park Ave., will build a 1 story, 100 x 205 ft. garage on Troy Ave.

N. Y., New York (Borough of Brooklyn)—F. H. Parsons, 60 Wall St., New York City, will build a 1 story, 200 x 225 ft. garage on 4th Ave. Estimated cost, $100,000.

N. Y., New York (Borough of Brooklyn)—The Pivnick Bldg. Co., 729 Saratoga Ave., will build a 1 story, 40 x 90 ft. garage at 428 Cleveland St. Estimated cost, $25,000.

N. Y., New York (Borough of Brooklyn)—Rechnitz Bros., 44 Court St., will build a 1 story, 45 x 100 ft. garage on Malbone St. near Rogers Ave. Estimated cost, $100,000.

N. Y., New York (Borough of Manhattan)—The B. and C. Mfg. Co., 294 Church St., has awarded the contract for the construction of a factory for the manufacture of bicycle parts. Estimated cost, $25,000. Noted Jan. 22.

N. Y., New York (Borough of Manhattan)—R. Berkowitz, 189 Orchard St., will build a 2 story, 80 x 100 ft. garage at 518 East 15th St. Estimated cost, $50,000.

N. Y., New York (Borough of Manhattan)—The Kraus & Sulverman Co., 350 Bway., will build a 1 story, 100 x 144 ft. garage at 510 West 130th St. Estimated cost, $35,000.

N. Y., New York (Borough of Manhattan)—F. Nathan, 235 West 101st St., will build a 2 story, 75 x 195 ft. garage on Commerce and Bedford Sts. Estimated cost, $85,000.

N. Y., New York (Borough of Manhattan)—The Ris Constr. Co., 291 Bway., will build a 2 story, 100 x 100 ft. garage on 10th Ave. and 56th St. Estimated cost, $70,000.

N. Y., New York (Borough of Manhattan)—E. Stromberger, 377 9th Ave., Long Island City, will build a 2 story, 100 x 150 ft. garage at 125 Prospect Ave. Estimated cost, $34,000.

N. Y., New York (Borough of Manhattan)—The Western Electric Co., 195 Bway., has awarded the contract for the construction of a 10 story, 201 x 323 and 200 x 340 ft. factory and warehouse on Greenwich, Clarkson and Hudson Sts. Estimated cost, $2,700,000.

N. Y., Niagara Falls—The Electric Smelting and Aluminum Co., Mill Tract No. 9, plans to build an addition to its factory on West Jackson St. Estimated cost, $10,000.

N. Y., Pyrites—The De Grasse Paper Co. has awarded the contract for the construction of a 2 story, 60 x 208 ft. machine room addition to its plant. Estimated cost, $100,000. Noted Apr. 22.

Pa. Johnstown—The Twin Valley Motor Car Co., Inc., is building a 66 x 180 ft. factory. J. B. McMeans, Pres.

Pa., Philadelphia—H. W. Butterworth & Sons, 2417 East York St., have awarded the contract for altering and building an addition to their factory for the manufacture of textile machinery. Estimated cost, $40,000.

Pa., Philadelphia—The Standard Crown Co., Hope and Palmer Sts., is having plans prepared by Mills & Van Kirk, Engrs. and Archts., Harrison Bldg., for the construction of a 2 story, 67 x 212 ft. factory on Clearfield and Masher Sts., for the manufacture of bottle tops. Estimated cost, $100,000.

Pa., Pittsburgh—The Autocar Sales and Service Co., is receiving bids until June 9th for the construction of a 1 story, 225 x 230 ft. sales and service building, on Liberty Ave. and Baum Blvd. Estimated cost, $120,000. H. W. Castor, Stephen Girard Bldg., Philadelphia, Archt.

Pa., Washington—S. M. Byers, 120 South Main St., is building a 3 story, 100 x 120 ft. garage and service station on East Main St. Estimated cost, $110,000.

SOUTHERN STATES

Fla., St. Cloud—H. H. Hull will build a lathe and planing mill.

MIDDLE WEST

Ill., Rock Island—The W. L. Frank Mfg. Co., 44th St. and R.R. Ave., has awarded the contract for the construction of a 1 story, 90 x 108 ft. factory for the manufacture of electric fixtures. Estimated cost, $50,000.

Ill., Sterling—The Fort Dearborn Mfg. Co. has awarded the contract for the construction of a 100 x 120 ft. foundry. Estimated cost, $50,000. G. S. Saunders, Pres.

Ind., Indianapolis—The H. A. Woods Co. is building a factory for the manufacture of "Dords" electric lamp.

Mich., Detroit—The Cable Draper Baking Co., Vermont and Marquette Sts., has awarded the contract for the construction of a 2 story, 90 x 150 ft. garage on Vermont St. and Ferry Park Ave. Noted Apr. 8.

Mich., Detroit—The A. Colton Co., 782 Jefferson Ave., is having plans prepared by Mildner & Eisen, Archts., 924 Hammond Bldg., for the construction of a 3 story, 60 x 100 ft. factory on Jefferson Ave. and Chene St., for the manufacture of machinery.

Mich., Detroit—A. J. Detlaff, East Lafayette St., has awarded the contract for the construction of a 1 story, 51 x 88 ft. addition to its foundry on Lafayette and Hastings Sts. Estimated cost, $10,000. Noted May 6.

Mich., Detroit—L. G. Grim, 395 Military Ave., has awarded the contract for the construction of a 1 story, 96 x 132 ft. garage on Linwood Ave. Noted Apr. 22.

Mich., Detroit—The E. F. Lyons Spring and Axle Co., Milwaukee Ave., is having plans prepared by Stahl & Kinsey, Archts., 435 Woodward Ave., for the construction of a 2 story, 60 x 93 ft. factory for the manufacture of auto parts. Estimated cost, $50,000.

Mich., Detroit—The Michigan Beef Co., 452 Riopelle St., will soon award the contract for the construction of a 1 story, 88 x 98 ft. garage and repair shop on Dix Ave. Estimated cost, $25,000. Malcomson, Higginbotham & Palmer, 405 Moffat Bldg., Archts.

Mich., Detroit—J. Schevitz, 195 Ferry Park Ave., will soon award the contract for the construction of a 1 story, 60 x 150 ft. garage on Willis Ave. Estimated cost, $30,000. J. I. Weinberg, 401-403 Congress Bldg., Archt.

Mich., Detroit—The F. L. and A. Smith Co., 1905 Dime Bank Bldg., Detroit, has awarded the contract for the construction of a 2 story, 93 x 220 ft. garage on Woodward Ave. near Parsons St. Estimated cost, $135,000.

Mich., Detroit—The Studebaker Corp., Brush and Piquette Aves., will soon award the contract for the construction of a 5 story, 82 x 441 ft. automobile plant on Jefferson and Clark Aves. A. Kahn, Marquette Bldg., Archt.

Mich., Flint—The Dort Motor Car Co. has awarded the contract for the construction of a 2 story, 41 x 168 ft. machine shop on South St. Noted Feb. 26.

O., Akron—The Summit Auto Co., 697 South Main St., is having plans prepared by E. McGeorge, Engr. and Archt., 1900 Euclid Ave., Cleveland, for the construction of a 3 story addition to its garage. Estimated cost, $100,000.

O., Ashland—The Alboy Co. is having plans prepared by Dercum & Beer, Archts., 4500 Euclid Ave., for the construction of a 2 story, 200 x 200 ft. factory for metal stamping. Estimated cost, $150,000.

O., Canton—Schlemmer & Graber, 12th St., N. E., have awarded the contract for the construction of a 2 story, 60 x 153 ft. garage. Estimated cost, $102,000.

O., Cleveland—The Frankle Light Co., 5016 Woodland Ave., will receive bids until May 27 for the construction of a 3 story, 56 x 110 ft. factory on East 51st St. and Woodland Ave., for the manufacture of electric fixtures. Estimated cost, $50,000.

O., Greenville—The Franklin Tractor Co., 1026 Lindsey Bldg., Dayton, is preparing plans for the construction of a 2 story, 100 x 200 ft. factory, here, for the manufacture of tractors. Estimated cost, $130,000.

O., New Philadelphia—The Dillon Electric Co., 11th St., N. E., and Mahoning Rd., Canton, is building a 1 story, 50 x 125 ft. factory, here, for the manufacture of electrical appliances.

O., New Washington—The New Washington Electric Supply Co. is building a 50 x 80 ft. factory.

Wis., Milwaukee—The Evinrude Motor Co., 279 Walker St., will build a 1 story, 200 x 300 ft., factory on 27th and Lake Sts. Noted Apr. 15.

Wis., Milwaukee—The A. C. Goethal Co., 301 4th St., manufacturer of blowers, is having plans prepared by J. Menge, Archt., 138 Wright St., for the construction of a 1 story, 60 x 120 ft. sheet metal shop on 32nd St.

Wis., Milwaukee—The A. H. Petersen Mfg. Co., Fratney and Keefe Aves., has awarded the contract for the construction of a 1 story, 60 x 65 ft. addition to its factory, for the manufacture of electric fittings. Estimated cost, $10,000.

Wis., Milwaukee—The H. A. Poppert Mfg. Co., 505 Cedar St., has awarded the contract for the construction of a 26 x 52 ft. foundry on 5th St. Estimated cost, $5,000.

Wis., Port Washington—The Turner Mfg. Co., manufacturer of gasoline engines, plans to enlarge present plant or build a new 4 story, 100 x 500 ft. unit. Estimated cost, $100,000.

WEST OF THE MISSISSIPPI

Kan., Argentine—The Pennsylvania Tank Line Co., Sharon, Pa., will soon award the contract for the construction of a 1 story, 78 x 321 ft. and 75 x 218 ft. car and tank repair shop, here.

WESTERN STATES

Cal., Bishop—The Bishop Union High School District will soon award the contract for the construction of a 2 story school, to include a manual training department. Estimated cost, $140,000. J. H. Stofflet, Clk. W. S. Weeks, 75 Post St., San Francisco, Archt.

CANADA

Ont., East London (London P. O.)—The Simmons Bed Co., Montreal, plans to build a factory, here, for the manufacture of beds and springs. Estimated cost, $100,000.

Ont., Guelph—The T. Eaton Co., Ltd., 190 Yonge St., Toronto, is having plans prepared by W. A. Mahoney, archt., 73 Quebec St., W., Guelph, for the construction of an addition to its stove factory and an office building, here. Estimated cost $115,000.

Ont., Petersboro—The Canadian General Electric Co., 212 King St., W., Toronto, has awarded the contract for the construction of a 6 story factory, here. Estimated cost, $500,000. Noted Apr. 15.

General Manufacturing

NEW ENGLAND STATES

Conn., Bridgeport—The Bridgeport Elastic Fabric Co., 209 Center St., is having plans prepared by Fletcher & Thompson, Inc., Engrs. and Archts., 1089 Broad St., for the construction of a 3 story addition to its factory. Estimated cost, $100,000.

Conn., Hartford—The United States Envelope Co., Cypress St., Springfield, Mass., has awarded the contract for altering its factory on South Ann St., here. Estimated cost, $35,000.

Conn., Norwalk—Foster, Stewart & Co., 373 Pacific St., Brooklyn, N. Y., has awarded the contract for the construction of a 1 story factory on Main and Broad Sts., here, for the manufacture of awnings. Estimated cost, $75,000. Noted May 13.

Me., Dixfield—The Elastic Webbing Co., Pawtucket, R. I., plans to build a 4 story, 100 x 150 ft. factory on the banks of the Webb River here. Estimated cost, $95,000.

Mass., Cambridge—H. Thayer & Co., 150 Bway., Boston, has awarded the contract for the construction of a 3 story, 40 x 80 ft. addition to its plant here, for the manufacture of chemicals. Estimated cost, $30,000.

Mass., Clinton—The Lancaster Mills are having plans prepared by Lockwood, Greene & Co., Archts. and Engrs., 60 Federal St., Boston, for the construction of a 4 story weave shed at its plant. Estimated cost, $150,000.

Mass., Springfield—The National Papeterie Co., Orleans St., will soon award the contract for the construction of a 1 story, 60 x 130 ft. addition to its plant for the manufacture of stationery. Estimated cost, $40,000. H. L. Sprague, 310 Main St., Archt.

Mass., West Springfield—The New England Box Co., c/o C. P. Newton, Archt., 318 Main St., Springfield, will soon award the contract for the construction of a 1 story box factory on Cold Springs Ave. Estimated cost $150,000. Noted Apr. 8.

N. H., Nashua—The Nashua Mfg. Co., Mine Falls, is having plans prepared by Lockwood & Greene, Archts. and Engrs., 60 Federal St., Boston, for the construction of an addition to its plant for the manufacture of cotton flannels and blankets. Estimated cost, $2,000,000.

R. I., Bellefont (Providence P. O.)—The Imperial Printing and Finishing Co. has awarded the contract for the construction of a 1 story, 80 x 100 ft. addition to its factory for the manufacture of textiles. Estimated cost, $25,000.

R. I., Woonsocket—The Amer. Wringer Co., 91 Social St., is having plans prepared by Cooley & Marvin Co., Archts., 711 Tremont Bldg., Boston, for the construction of additions to its plant, to include a 1 story, 80 x 100 ft. dry kiln building, a 2 story, 60 x 180 ft. mechanical roll building and a 3 story, 40 x 90 ft. warehouse addition. Estimated cost, $100,000.

MIDDLE ATLANTIC STATES

Md., Baltimore—Knothe Bros., 124 5th Ave., New York City, will soon award the contract for the construction of a 1 story, 60 x 95 ft. and a 2 story, 27 x 35 ft. addition to their factory here, for the manufacture of suspenders. Estimated cost, $100,000.

N. J., Jersey City—The Amer. Butterine Co., Henderson St., has awarded the contract for the construction of a 5 story, 50 x 100 ft. factory. Estimated cost, $100,000.

N. J., Kearny—The Nairn Linoleum Co. is having sketches made by C. B. Baldwin, Archt., 45 Clinton St., Newark, for the construction of a 3 story factory on Belgrove Drive.

N. J., Newark—J. Campbell & Co., 75 Hudson St., New York City, has awarded the contract for the construction of a 1 story, 91 x 223 ft. dye building and power house on Plum Point Lane, here.

N. J., Newark—The United Color and Pigment Co., Evergreen and McClelland Sts., has awarded the contract for the construction of a 1 and 2 story, 70 x 200 ft., 30 x 90 ft. and 20 x 25 ft. paint factory.

N. J., Vineland—The State Bldg. Comn. of New Jersey, Trenton, plans to build a 50 x 75 ft. storehouse and refrigerator plant, here, to include machinery for canning goods, etc. Estimated cost, $30,000. F. H. Bent, 142 West State St., Trenton, Archt.

N. Y., Bainbridge—The Casein Mfg. Co., 15 Park Row, New York City, will rebuild its plant here, which was recently destroyed by fire. Loss $250,000.

N. Y., Beaver Falls—The J. P. Lewis Co., manufacturer of paper, will reconstruct buildings to replace those which were recently destroyed by fire. Estimated cost, $100,000.

N. Y., Herkimer—The Universal Counter Co., recently incorporated with $100,000 capital stock, has purchased a part of the plant of the West Canada Lumber Co., here, and plans additions and alterations. Estimated cost, $30,000.

N. Y., New York (Borough of Queens)—The Eclaya Co., Inc., 148 Madison Ave., New York City, is building a 4 story, 100 x 100 ft. factory and laboratory on 1st and Freeman Sts., Long Island City, for the manufacture of chocolates. Estimated cost, $75,000.

N. Y., Rochester—M. B. Schwartz, manufacturer of buttons, plans to build a 4 story, 60 x 105 ft. addition to his factory on Monroe Ave. and Rutgers St. Estimated cost, $75,000.

Pa., Collingsdale—The Jobson Chocolate Co., c/o Day & Zimmerman, Archts., 611 Chestnut St., Philadelphia, is receiving bids for the construction of a 1 story, 60 x 100 ft. factory. Noted Mar. 11.

Pa., Creasy (Mifflinville P. O.)—The Creasy Creamery Co. is having plans prepared by G. F. Shroeder and C. Schmidt, Archts., Wietzenkorn Bldg., Wilkes-Barre, for the construction of a 2 story, 50 x 100 ft. creamery, on Main Rd. Estimated cost, $100,000.

Pa., Harrisburg—The Jackson Mfg. Co., 4th and Boyd Sts., has awarded the contract for the construction of a 1 story, 90 x 480 ft. factory on South 11th St., for the manufacture of wheelbarrows. Estimated cost, $100,000.

Pa., Holmesburg (Philadelphia P. O.)—The Robertson Lubricants Co., Bulletin Bldg., Philadelphia, has awarded the contract for the construction of a 1 story, 20 x 60 ft. factory, here, for the manufacture of lubricants. Estimated cost, $10,000.

Pa., Kingston (Wilkes-Barre P. O.)—The Crane Bros. Silk Co. has awarded the contract for the construction of a 2 story, 48 x 121 ft. mill on Market St. Estimated cost, $11,000.

Pa., Philadelphia—The Glen Knitting Co., 2nd and Westmoreland Sts., will soon award the contract for the construction of a 5 story, 145 x 160 ft. hosiery mill on Lippincott and 21st Sts. W. E. Dyer, Land Title Bldg., Archt. and Engr.

Pa., Philadelphia—The Mineral Vault Casket Co., 5632 Summer St., has awarded the contract for the construction of a 2 story, 65 x 100 ft. factory. Estimated cost, $40,000.

Pa., Washington—The Hazel Atlas Glass Co., is building a 1 and 2 story, 100 x 368 ft. glass factory addition. Estimated cost, $500,000.

SOUTHERN STATES

S. C., Cayce—The Seminole Fertilizer and Oil Co., Jacksonville, Fla., has had plans prepared for the construction of a 3 story, 75 x 200 ft. factory, here. Estimated cost, $300,000.

Va., Richmond—The Standard Paper Mfg. Co., Hull and Canal Sts., is building a factory for the manufacture of blotting paper. Estimated cost, $150,000.

W. Va., Morgantown—The Seaman Mill and Lumber Co. plans to build a 1 story, 125 x 312 ft. planing mill. Estimated cost, $50,000.

MIDDLE WEST

Ill., Chicago—W. G. Rosenberger, 214 West Ontario St., is having plans prepared by A. S. Alschuler, Archt., 28 East Jackson St., for the construction of a 3 story, 80 x 100 ft. factory on La Salle and Ontario Sts. for the manufacture of cigar boxes. Estimated cost, $250,000.

Ill., Chicago—The Transo Envelope Co., 3550 Kimball Ave., has awarded the contract for the construction of a 1 story, 210 x 350 ft. factory. Estimated cost, $275,000.

Ill., Moline—A. S. Abraham & Co., 20th St. and 2nd Ave., has awarded the contract for the construction of a 4 story, 40 x 144 ft. factory for the manufacture of candy. Estimated cost $100,000.

Ind., Richmond—The Richmond Air Compressor Co. is building an 80 x 140 ft. factory. Estimated cost, $25,000. M. L. Kirkman, Mgr.

Mich., Detroit—The Morgan & Wright Co., Bellevue Ave., has awarded the contract for the construction of a 9 story, 326 x 456 ft. tire factory and warehouse, on Jefferson Ave. Estimated cost, $4,000,000.

Mich., Detroit—The Newton Packing Co., 1041 14th Ave., will soon award the contract for the construction of a 1 story, 68 x 95 ft. packing house. Estimated cost, $40,000. Mildner & Eisen, 924 Hammond Bldg., Archts.

Mich., Saginaw—The Herzog Art Furniture Co., 1900 South Michigan St., will soon award the contract for the construction of a 3 story, 85 x 227 ft. factory. Estimated cost, $95,000. Cooper & Beckbissinger, 114 South Jefferson St., Archts.

O., Alliance—The Fairmount Provision Co., recently incorporated, plans to build a packing plant on Mahoning Ave. Estimated cost $100,000. J. Adams, Fairmount Rd., and F. Senn, 2541 Ridgewood Ave., are the incorporators.

O., Canton—The Hoover Suction Supply Co. has had plans prepared by B. H. Prack, Engr., Keystone Bldg., Pittsburgh, for the construction of a 130 x 130 ft. factory. Cost between $300,000 and $400,000.

O., Cincinnati—The Hercules Rubber Corp., 908 Union Central Bldg., plans to build a 2 or 3 story, 200 x 300 ft. factory for the manufacture of auto tires. Estimated cost, $500,000. W. G. Brown, 2801 Union Central Bldg., Engr.

O., Cleveland—The Blue Valley Creamery Co., Co., c/o Best & Hoeffler, Archts., Vickers Bldg., will receive bids until May 26 for the construction of a 1 and 2 story, 70 x 160 ft. factory at 1802 East 47th St. Estimated cost, $60,000.

O., Cleveland—The Gebauer Chemical Co., 9408 St. Catherine Ave., has awarded the contract for the construction of a 1 story, 40 x 100 ft. addition to its factory. Estimated cost, $25,000.

O., Toledo—The Andes Tire and Rubber Co. has awarded the contract for the construction of a 3 story, 80 x 300 ft. factory on Star Ave. Estimated cost, $200,000.

Wis., Horicon—The Columbus Canning Co. has awarded the contract for the construction of a 2 story, 96 x 108 ft. factory on Main St. Estimated cost, $40,000. S. Davidson, Supt. Noted Jan. 15.

Wis., Manitowoc—The Spindler Co. has awarded the contract for the construction of a 2 story, 60 x 130 ft. artificial ice plant on 8th St.

Wis., Sheboygan—The Amer. Hide Leather Co., 1102 Wisconsin Ave., has had preliminary plans prepared by Juul & Smith, Archts., Imig. Bldg., for the construction of a 2 story, 50 x 130 ft., addition to its tannery. Estimated cost, $50,000.

Wis., West Bend—The Schmidt & Stork Wagon Co., Mill St., will soon award the contract for the construction of a 1 story, 100 x 280 ft. factory. Estimated cost, $55,000. A. Juth, c/o owner, Archt. Noted Mar. 4.

WEST OF THE MISSISSIPPI

Tex., McKinney—The Sunlite Co. has awarded the contract for the construction of a 1 story, 90 x 136 ft. factory for the manufacture of auto accessories. Noted April 22.

Tex., Texarkana—The Southern Steel Products Co., 520 Spring St., will build a 2000 bbl. refinery. Estimated cost, $60,000. G. M. Whitin, Mgr.

Wyo., Laramie—The Standard Oil Co. is building a Burton process pressure plant, to include ten 8 x 40 ft. pressure stills, and storage equipment.

WESTERN STATES

Cal., Westend—The Westend Mining Co. has awarded the contract for the construction of a borax plant to include an 80 x 180 ft. mill building, a 32 x 48 ft. boiler house and several 180 x 220 ft. spray ponds, 1 to 8 ft. deep.

CANADA

Ont., Hanover—The Hanover Cotton and Woolen Co. plans to build a clothing and knitting factory. Estimated cost, $60,000.

Que., St. Henri de Montreal—C. Laflueur, Workman St., Montreal plans to build a 3 story, 50 x 90 ft. shoe factory on Greene Ave., here. Estimated cost, $200,000.

Ont., Toronto—The Evening Telegram, Bay and Melinda Sts., has awarded the contract for the construction of a 5 story printing shop, on Dupont St. Estimated cost, $85,000.

Ont., Toronto—The United Drug Co., Ltd., 78 Broadview Ave., has awarded the contract for the construction of an addition to its factory. Estimated cost, $130,000.

"OPPORTUNITY" ADVERTISING
SEARCHLIGHT SECTION
See Pages 313 to 350
See Pages 313 to 350